12-2004

3D Sound Synthesis using the Head Related Transfer Function

Dayu Yang
University of Tennessee - Knoxville

To the Graduate Council:

I am submitting herewith a thesis written by Dayu Yang entitled "3D Sound Synthesis using the Head Related Transfer Function." I have examined the final electronic copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Electrical Engineering.

Daniel B. Koch, Major Professor

We have read this thesis and recommend its acceptance:

Michael J. Roberts, Paul B. Crilly

Accepted for the Council:
Carolyn R. Hodges

Vice Provost and Dean of the Graduate School

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3D SOUND SYNTHESIS USING THE HEAD RELATED TRANSFER FUNCTION

A Thesis
Presented for the
Master of Science
Degree
The University of Tennessee, Knoxville

DAYU YANG
December 2004

ACKNOWLEDGEMENTS

First of all, I would like to thank my advisor, Dr. Daniel B. Koch for giving me the opportunity to work in the Applied Visualization Center during my graduate study in the Department of Electrical and Computer Engineering. I thank him for his guidance and particular patience and kindness.

I also thank my committee members, Dr. Michael J. Roberts and Dr. Paul B. Crilly, for their constant support during the course of my thesis work.

I am very grateful to my parents and my brother for their constant encouragement and endless love.

Lastly, I thank my fiancée Sijie Yu for her love and support during the past 7 years.

ABSTRACT

Three-dimensional (3D) sound is a significant component of virtual reality. 3D sound systems or directional sound systems are designed to animate the sound space produced by real sound sources. In this thesis, basic concepts of 3D sound are introduced. The Head Related Transfer Functions (HRTFs) are analyzed in both the time and frequency domain. A 3D sound system is implemented using practical, measured HRTF data.

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Chapter 1

Introduction

Humans use hearing to detect significant sounds and to communicate with their environment. Also, hearing is used somewhat to estimate the position of a sound source. Like vision, hearing is also three dimensional. One hears sounds from left or right, up or down, and near or far.

One is surrounded by a sound space; different sounds arrive at the ears from all directions with characteristics like pitch, tone, loudness, and spatial characteristics like distance and location. So, an individual sound can be distinguished by its own characteristics. Imagine sitting in a concert hall with closed eyes. One hears the melody of a piano from the stage corner, a solo by a favorite singer from the center of the stage, the low-pitched sound of a bass from the back of the orchestra. One might also hear people applauding the performers. At different positions in the concert hall, people hear a different musical mix since the spatial characters of the sounds are different. These sounds, as well as sounds people hear in everyday life, are 3D sounds, or *spatial sounds*. This is what people call Natural Spatial Hearing, which "refers to how we hear sounds spatially in everyday hearing, with our ears uncovered, our head moving and in interaction with other sensory input."[1]

How does a traditional stereo sound reproduction system work? Traditional stereo sound reproduction can also provide some spatial information, but this information is not

enough to help the listener recreate a full 3D sound space like the real sound event. For example, a hi-fi CD player with headphones, which mixes the sounds of two channels to represent the original performance, plays the same symphony as heard in the concert. However, the listener would have the impression that all the sound space and all the instruments are placed inside the head, though he can still tell the position difference between those instruments. Furthermore, the listener cannot interact with the sound event. There is no difference in the music the listener perceives no matter how the listener changes his position or turns his head. This is because the CD and CD player do not contain certain spatial information. If digital filters are add to the headphone to generate a virtual auditory space, the listener could enjoy the performance just like he does in the concert hall in person. This is what virtual spatial hearing accomplishes.

Virtual spatial hearing "refers to the formation of synthetic spatial sound imagery using a 3D system". [2] For example, in Figure 1.1, there are only two real sound sources in this auditory space, the two loudspeakers, but one can control and manipulate signals presented to the loudspeakers to generate a virtual sound source. An image of sound source *S*' is produced based on the sounds perceived.

3D sound research is a newly developing field compared to the highly developed 3D visual research field. Newly conducted research in 3D sound might even bring great help to visually impaired people. Spatialized sounds can be related to different interactions as auditory icons of a graphic user interface, so a visually impaired person could touch those icons to operate a computer. 3D sound display techniques are used to provide pilots or submarine sonar operators with real-time information of the surrounding air space or water volume to help them identify nearby moving objects. 3D sound is also a hot topic

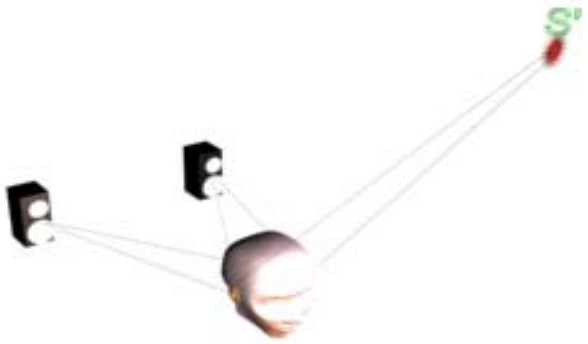

Figure 1.1 A virtual sound source *S*' produced by a loudspeaker system in a virtual auditory environment

in video games and other entertainment applications. Sound helps players find their aims in games and make those games seem much more real, attracting as much attention as possible. In the University of Tennessee Applied Visualization Center's project named AirportViz**,** 3D sound can be associated with various airport security detection devices so that those devices sound an alarm to notify the security personnel when suspicious passengers or cargo are passing through. [3]

More and more, 3D sound technologies are being used in the real world. Research on 3D sound is becoming an increasingly important part of engineering research. This paper presents the area of 3D sound and discusses practical techniques for 3D sound reproduction.

The following is an outline of this thesis. Chapter 2 introduces the background and part of the scientific basis of 3D sound. Chapter 3 explains in detail the visualization of 3D

sound, mainly focusing on HRTFs. Chapter 4 describes an experiment simulating 3D sound and its results. Chapter 5 summarizes this work, presents conclusions, and suggests future extensions.

Chapter 2

Background

In order to understand how a sound source is localized, it is necessary to introduce a model of the human head in a sound space.

There are three important planes that cross the listener's head in the sound space. In Figure 2.1, the region in which every point is equidistant from the two eardrums is called the Median Plane. The one that divides the listener's head horizontally through the two eardrums is called the Horizontal Plane. Finally, the one that divides the listener's head vertically through the two eardrums is called the Frontal Plane.

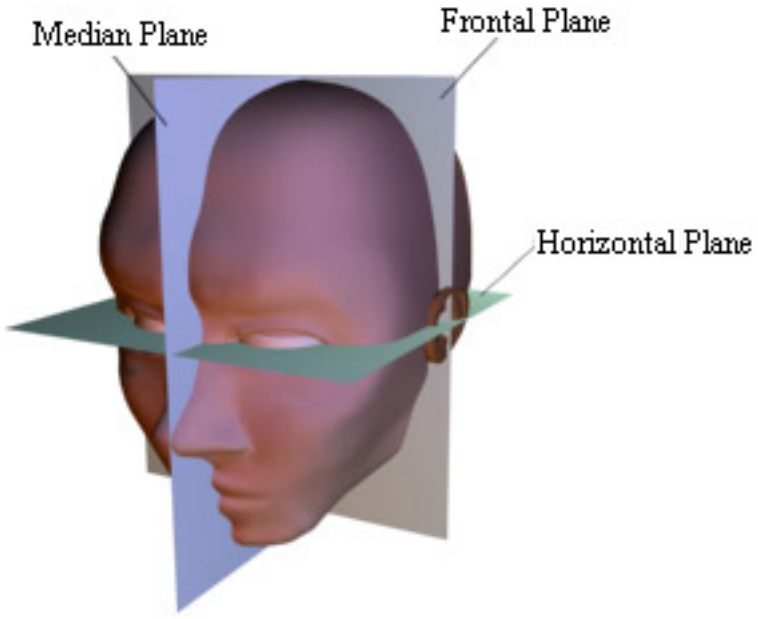

Figure 2.1 Positions of frontal, median, and horizontal planes

Distance(r), azimuth (φ), and elevation (θ) are used to describe the position in an auditory space centered at the midpoint between the two ears. The position of a sound source S related to the midpoint O is presented in Figure 2.2. Distance is the magnitude of vector $\vec{OS}$. Elevation is the angle between $\vec{OS}$ and the Horizontal Plane, from –90 degrees to 90 degrees. Azimuth is the angle between the projection of $\vec{OS}$ on the Horizontal Plane and Median Plane. Azimuth goes from 0 degrees to 360 degrees all around the head.

2.1 Localization and Localization Cues

Localization in this thesis refers to a determination of the direction and distance of a sound source in the real world environment. In natural spatial hearing, people use localization cues to locate an auditory event in a sound space. In this chapter, several

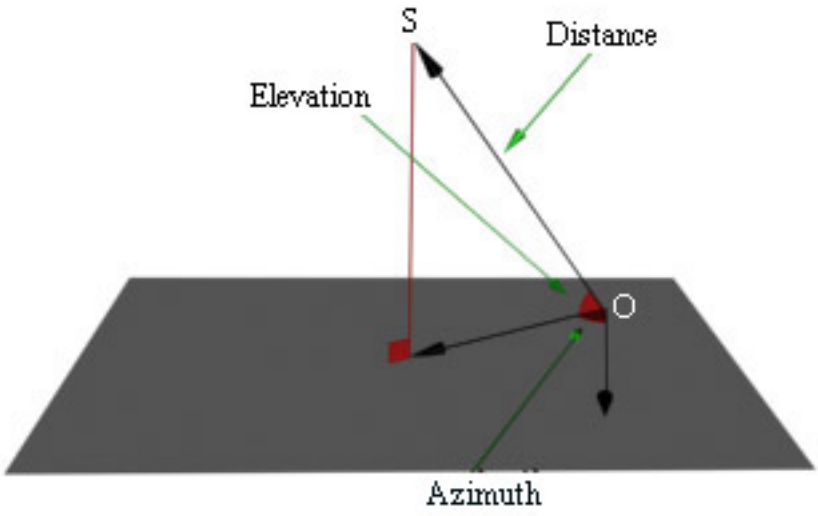

Figure 2.2 Distance, azimuth, and elevation of a sound source

localization cues are introduced and their roles in sound transmission are discussed.

2.1.1 Interaural Cues

The Interaural Time Difference (ITD) and Interaural Intensity Difference (IID) are considered primary cues for sound localization. A sound signal sent from a sound source *S* arrives at a listener's two eardrums with different intensities at different times. As shown in Figure 2.3(a), a sound signal emitted from *S* takes time periods t_L and t_R to reach the right ear through $\vec{SR}$ and the left ear through $\vec{SL}$. The value $|t_R - t_L|$ is the ITD in this case. When the sound source is located in the Median Plane (azimuth = 0^o), see Figure 2.3(b), the ITD is zero (not really zero because of the asymmetry of the human body but that difference is to be neglected in this paper); when the sound source is moved to the Frontal Plane (azimuth = 90° or 270°), Figure 2.3(c), the ITD is a maximum which is around 0.6ms for a typical-size human head by assuming the speed of sound is 343 m/s and the distance between the two eardrums is about 0.2 meter.

At the same time, the distances $\vec{SL}$ and $\vec{SR}$ act to dampen the signals perceived by the two ears. The signals lose some energy along these paths. The two paths differ, so an intensity difference is produced which is called the Interaural Intensity Difference (IID). The IID is sensitive to high frequencies.

"ITD represents a powerful and dominating cue at frequencies below about 1.5 KHz" whereas "the IID is an effective cue in the frequency range above 1.5 KHz, therefore, forming a complementary cue to the ITD. Together, the ITD and IID cover the whole audible frequency range." [4]

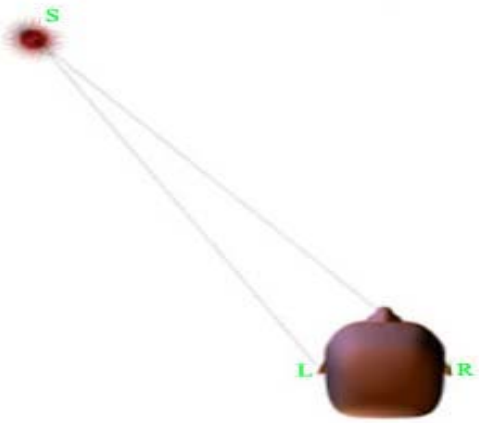

Figure 2.3(a) A sound source in sound space

Figure 2.3(b) A sound source in Median Plane

Figure 2.3(c) A sound source in Frontal Plane

Once researchers tried to locate sound sources using the ITD and IID only in 3D systems. Sometimes this approach works but if *S* were located in the Frontal Plane, the ITD and IID would be very small, which explains why people also cannot locate a moving sound source in the Median Plane since the ITD and IID are both diminished. Also, the ITD and IID cannot explain one-ear localization. So other cues must be responsible for Median Plane and monaural localization.

2.1.2 Spectral Cues

Interaural cues help people determinate the horizontal component, azimuth, of a sound event. To determinate the vertical component, elevation, spectral cues are used by human auditory system. "Spectral cues stem from reflections of short wavelength sound waves off the listener's upper body (torso) and off the outer ears (pinnae)". [5] The main source of IID is the obstruction of the signal to the ears by the head and torso. At low frequencies, a sound wave is diffracted around the head and torso to reach the two eardrums without being considerably distorted. At high frequencies, the wavelength of a sound wave is smaller than the head and torso, so the pinna response and shoulder echo play important roles in perceived signals.

To a high frequency, "the pinna with its irregular shape and resonant cavities acts as an acoustical filter". [6] High frequencies are filtered by the pinna so that people perceive a changed sound wave that will affect the localization of a sound source. From research, the pinna response is highly dependent on the elevation component of a sound source. [6]

On the other hand, the shoulders of the human body reflect the high frequencies of a sound signal. Echoes are produced in this way and received by the ears as delayed signals that are dependent on the elevation.

2.1.3 Distance Cues

Loudness cues help people to judge the distance of a sound event. The closer the sound event, the louder the sound. The relationship between intensity (I) and distance (r) is given by

$$I_L / I_R = r_R^2 / r_L^2 \qquad (2.1)$$

That is, sound fades by 3dB as the distance is doubled.

However, loudness cues work well only in anechoic environments. In a reverberant environment, the direct-to-reverberant energy ratio is the primary cue for distance perception. [5, 6] Reverberation will be discussed more in Section 2.1.5.

2.1.4 Dynamic Cues

When it is hard for a listener to locate sound sources using interaural cues and spectral cues, it is quite natural to move the head to resolve the ambiguity. For example, if a sound source is located in the Median Plane as shown in Figure 2.3(b), the IID and ITD are diminished. So the interaural cues are insufficient to provide information for the location of a sound source. If the listener turns his head by some angle, the sound source and the head are then in positions shown in Figure 2.3(a), which considerably increases the IID and ITD to help localize the sound.

2.1.5 Reverberation

In a reverberant environment, people perceive sounds from sound sources both directly and from sounds reflected from surrounding surfaces, like walls, floors, ceilings, etc. In this case, the loudness cue is no longer valid because the intensity becomes the sum of intensities of the direct sound, early echo response, and late reverberation. The direct-to-reverberant energy ratio

$$P_D / P_R = r_r / r \qquad (2.2)$$

becomes a more effective distance cue, which is dependent on the reverberation distance, r_r, and the distance, r, from the sound source. [5]

Each surface that reflects sound waves can be regarded as an individual sound source. So a single source reverberant space can be treated as a multi-source anechoic space. Since a multi-source sound space is beyond the treatment of this thesis, and would introduce a prohibitive computational burden, only one sound source in an anechoic space is considered in this paper.

There are still many other localization cues like vision, the Precedence Effect [7], and so on, which affect the listener's judgment physically and psychologically. In this thesis, since HRTF measurements capture most of the physical cues, other effects will not be considered separately in this thesis.

2.2 Head-Related Transfer Functions

Some major localization cues and their effects have been discussed. How can one use these cues empirically to predict the spatial location of a sound event in the reproduction

of 3D sound? “Consequently, as a first step toward understanding spectral cues in directional hearing, many researchers have tried to physically model, empirically measure, or more recently computationally simulate the direction-dependent frequency response of the ear directly. These measurements are called Head-Related Transfer Functions (HRTFs).” [8] An HRTF (or HRIR, Head-Related Impulse Response) is measured from the sound source to the listener’s eardrum as the convolution between the sound signal and the acoustic filter modeled from the sound source to the listener’s eardrum. The HRTF captures the location-dependent spectral changes that occur when a sound wave travels from a sound source to the listener's ear drum. These spectral changes are due to diffraction of the sound wave by the torso, head, and outer ears or pinnae, and their character depends on the azimuth, elevation, and range from the listener to the source. A detailed HRTF analysis will be presented in the following chapter.

Chapter 3

Analysis of 3D Sound using HRTFs

The HRTF is the far-field frequency response of a specific individual's or a mannequin's left or right ear. The HRTFs are measured from a chosen point in the ear canal to a cluster of specific points with a same radius from the listener's head. The HRTFs are used to develop pair FIR filters for each test point. Thus, to create a virtual sound image at a specific position, a pair of corresponding FIR filters is applied to the original sound to obtain the effect.

3.1 HRTF Measurement

The complexity of the geometry for the whole sound space makes it impossible to find a mathematical solution for HRTFs, so experimental measurements of HRTFs are widely used in many kinds of applications. So far, there is no one set of standard HRTFs that exist. Researchers or engineers choose different methods of HRTF measurement in their applications. If 3D sound systems, which should produce excellent effects, are custom designed for different users, a set of HRTFs for each listener needs to be measured, which is inconvenient and time-consuming. If an inexpensive, general-use system, like the one implemented in this thesis to demonstrate concepts of 3D sound is required, a set of experimentally measured HRTFs or modeled HRTFs is sufficient for this task since the accuracy of sound localization is of less importance.

A common method used to practically measure an HRTF is to put a probe-tube microphone into a subject's ear, then to play a known sound signal as the stimulus through a loudspeaker, which is located with specific azimuth, elevation, and distance. [9] The perceived sounds are recorded through the microphone and compared to the original sound to compute the HRTF.

As introduced before, HRTFs are functions of many variables, known or unknown. So, a simple method using four variables, the sound frequency and three spatial coordinates, to present the HRTFs was adopted by researchers. In real applications, it can be made simpler by using only three variables to create the HRTFs. In a sound space, for a source-receiver distance greater than the reverberation distance, the sound space can be considered to be a diffuse field, in which the sound intensity level is independent of the source-receiver distance. Usually, the reverberation distance is approximated as 1 meter.

HRTF data used in this thesis were measured by Bill Gardner and Keith Martin from MIT Media Lab on May, 1994 [10].The data were made in MIT's anechoic chamber using a dummy head called KEMAR (Knowles Electronic Manikin for Auditory Research). The spherical space around the KEMAR was sampled at elevations from -40 degrees (40 degrees below the horizontal plane) to +90 degrees (directly overhead). At each elevation, a full 360 degrees of azimuth was sampled in equal sized increments. The increment sizes were chosen to maintain approximately 5-10 degree great-circle increments. The distances from those test points to the center of the listener's head are 1.4 meters. [10].

3.2 Time Domain Representation of HRTF

In the time domain, HRTFs are represented as HRIRs (Head-Related Impulse Responses). Actually, in an HRTF measurement, it is the HRIRs that are recorded directly for a human subject. HRIRs can be inserted into a 3D sound system as a number of FIR filters.

In the time domain representation of HRTFs, HRIRs are compared at the same elevation or azimuth level to see the time difference of the occurrence of initial peaks and their amplitude difference. Figures 3.1 and 3.2 show the left and right ear HRIRs with the same elevation of -40 degrees, respectively. Figures 3.3 and 3.4 show the left and right ear HRIRs located in the horizontal plane. Figures 3.5 and 3.6 show the left and right ear HRIRs with the same elevation of 40 degrees. In these plots, the azimuth changes from 0 to 360 degree and 256 points of the HRIRs are drawn. Figures 3.7, 3.8, 3.11, and 3.12 compare the left and right ear HRIRs located in the median plane, and Figures 3.9, 3.10, 3.13, and 3.14 compare the left and right ear HRIRs located in the frontal plane. In these plots, the elevation changes from -40 to 90s degree and 256 points of the HRTFs are drawn. All of these plots are created using the MATLAB function, MESH, while the x-axis is the azimuth or elevation of the HRIR, the y-axis is the sample number of the HRIR, and the z-axis is the amplitude of the HRIR.

From Figures 3.1 to 3.6, the variation in the delay of the impulse setting with azimuth values from 0°–360° can be easily seen. The variation is mainly due to the ITD. For the left ear, an impulse with an azimuth value of 90° is the farthest, so the delay for this signal is the biggest. For the right ear, an impulse with an azimuth value of 90° causes the smallest delay.

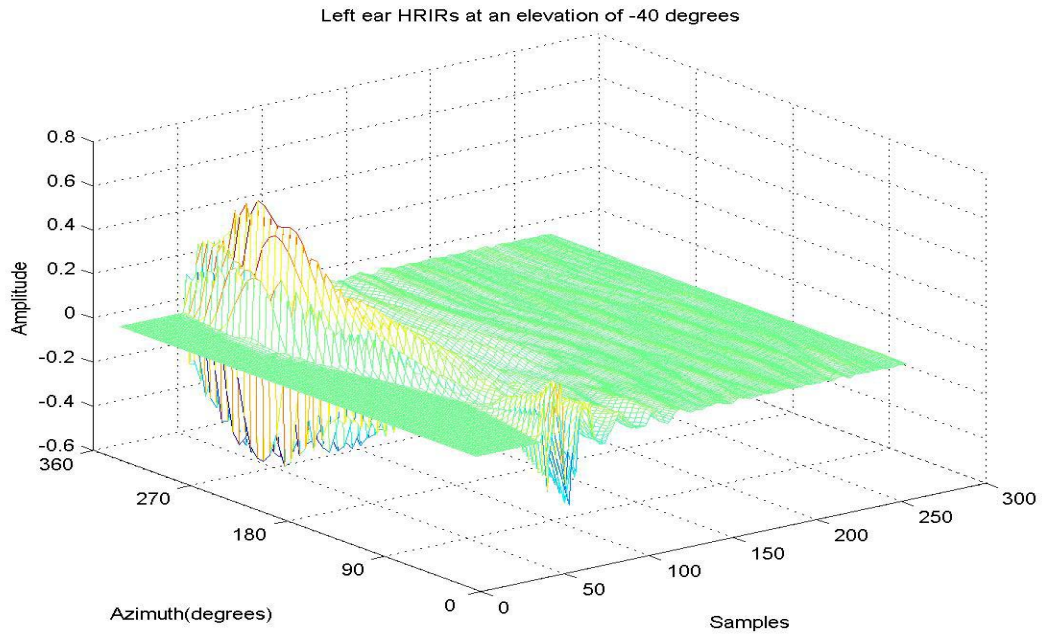

Figure 3.1 Left ear HRIRs at an elevation of -40 degrees

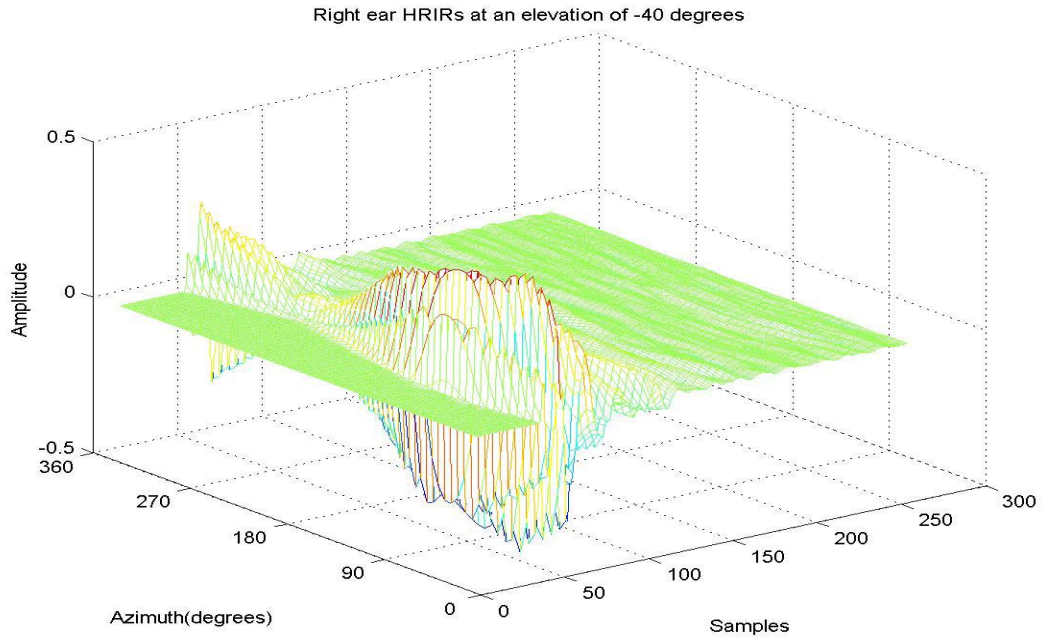

Figure 3.2 Right ear HRIRs at an elevation of -40 degrees

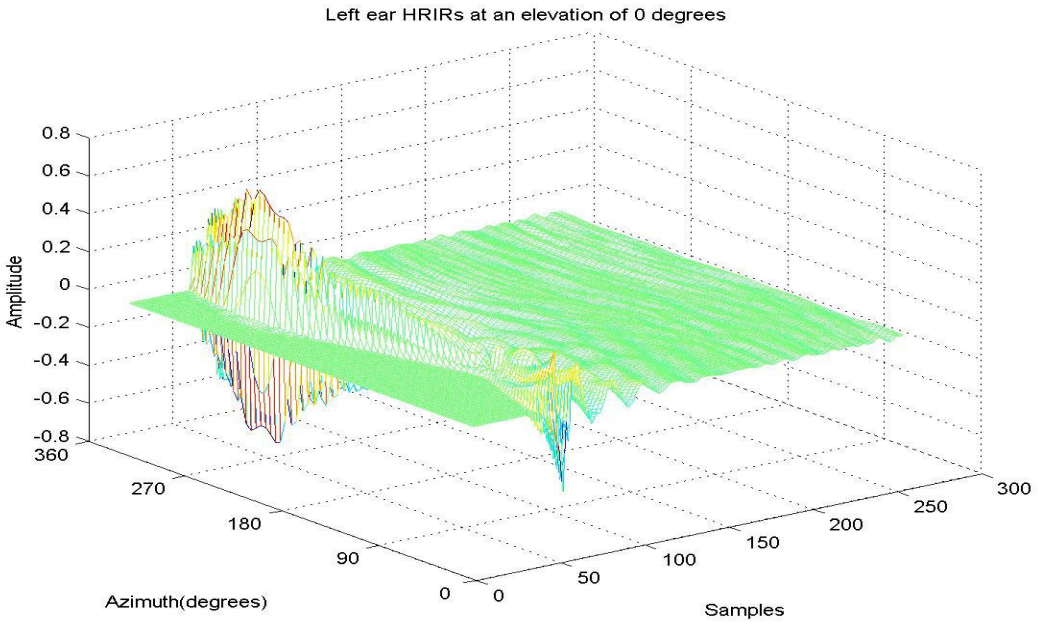

Figure 3.3 Left ear HRIRs at an elevation of 0 degrees (on the Horizontal Plane)

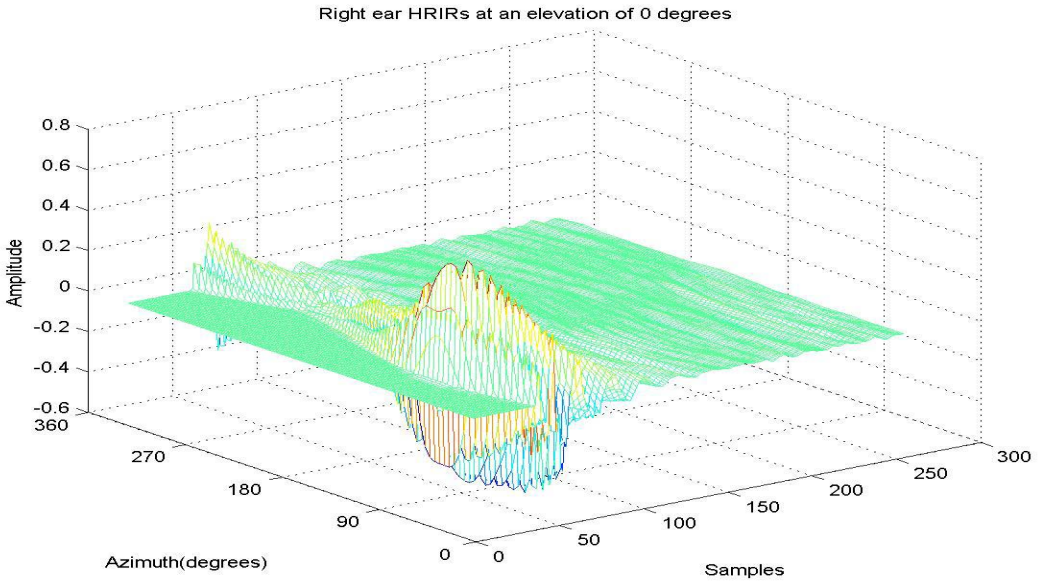

Figure 3.4 Right ear HRIRs at an elevation of 0 degrees (on the Horizontal Plane)

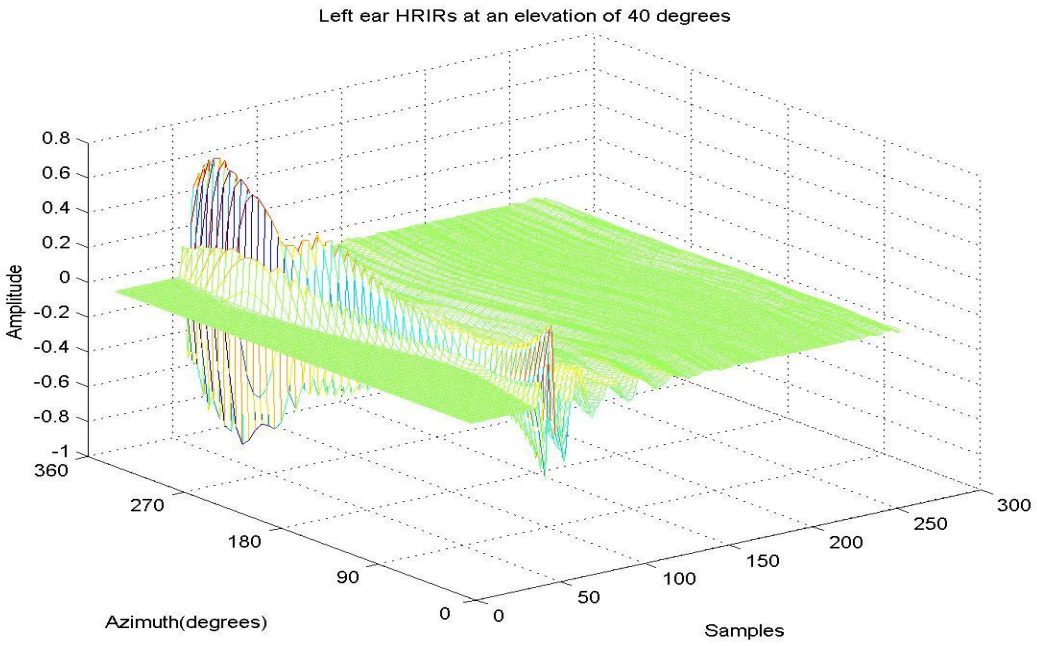

Figure 3.5 Left ear HRIRs at an elevation of 40 degrees

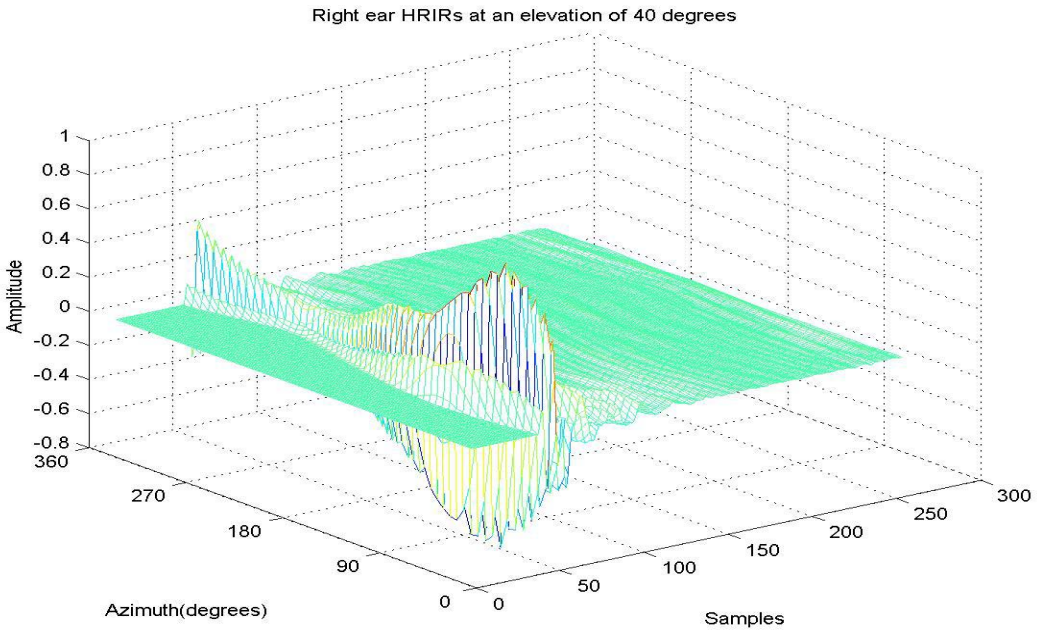

Figure 3.6 Right ear HRIRs at an elevation of 40 degrees

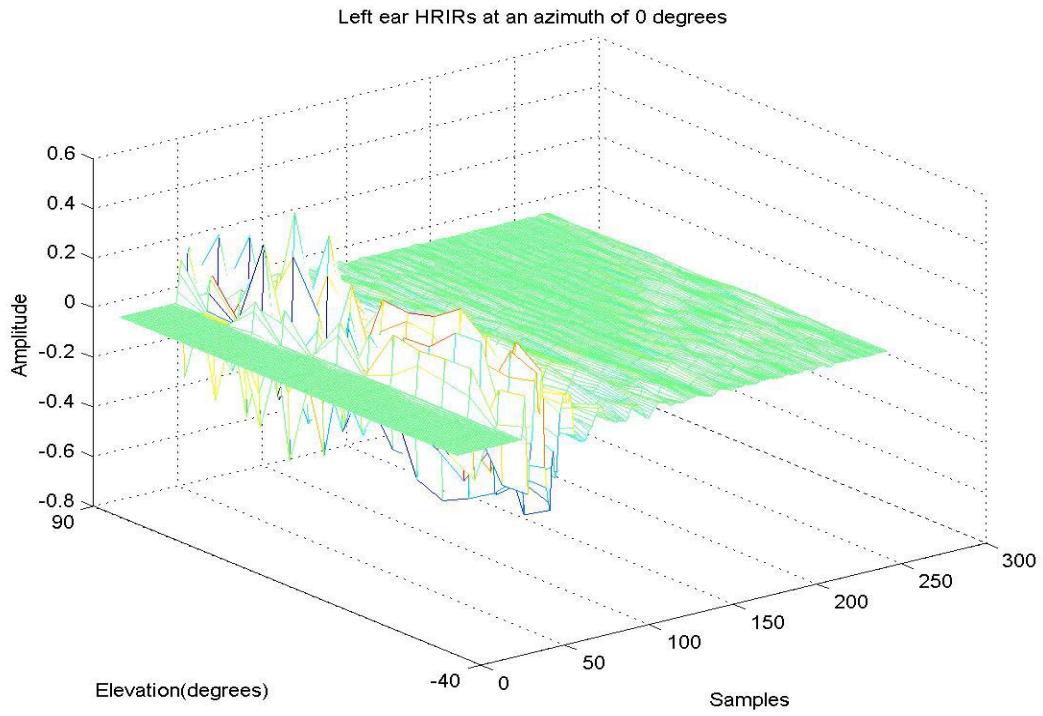

Figure 3.7 Left ear HRIRs at an azimuth of 0 degrees (on the Median Plane)

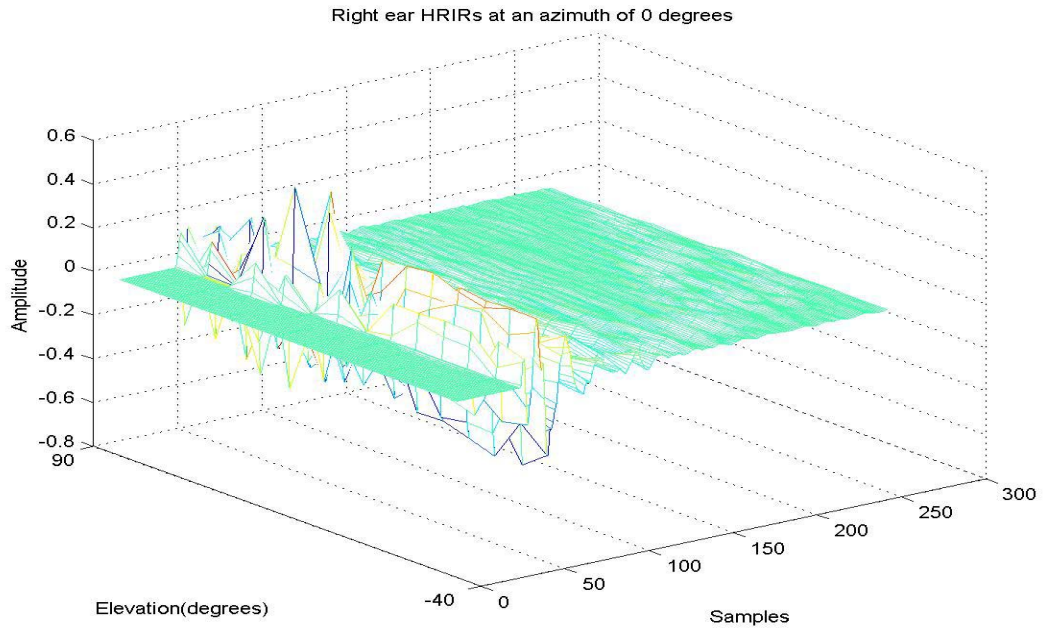

Figure 3.8 Right ear HRIRs at an azimuth of 0 degrees (on the Median Plane)

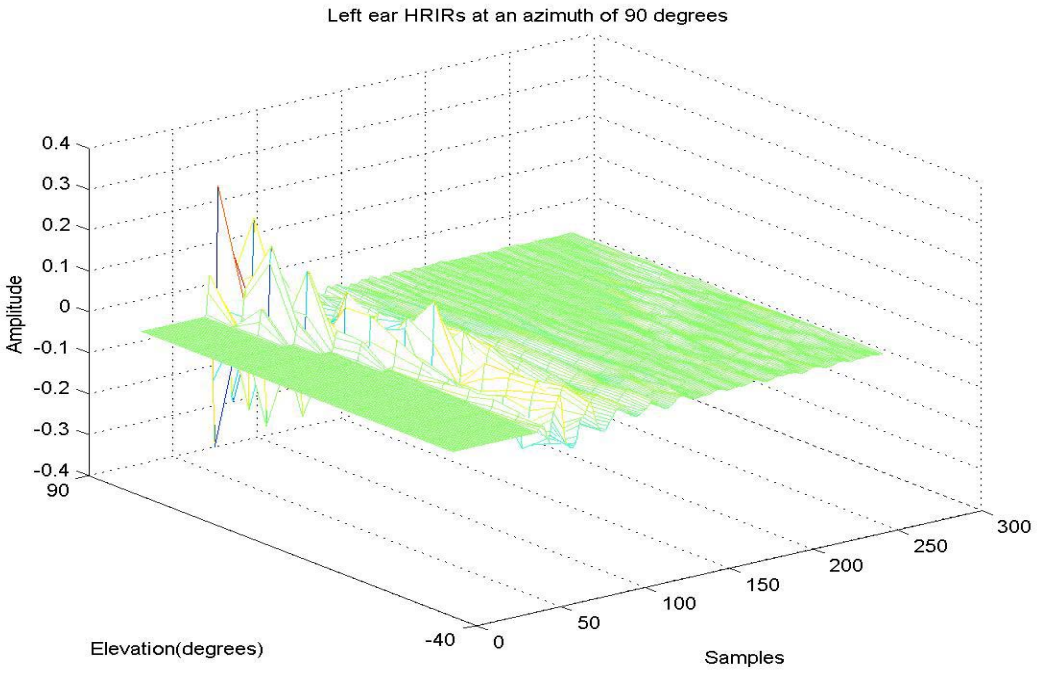

Figure 3.9 Left ear HRIRs at an azimuth of 90 degrees (on the Frontal Plane)

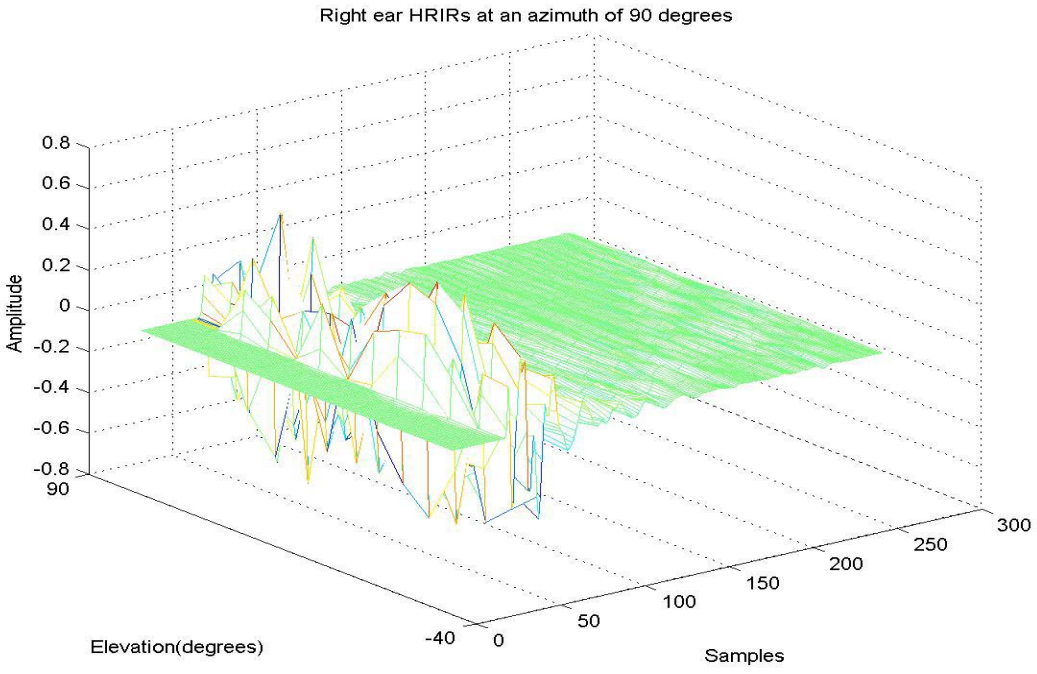

Figure 3.10 Right ear HRIRs at an azimuth of 90 degrees (on the Frontal Plane)

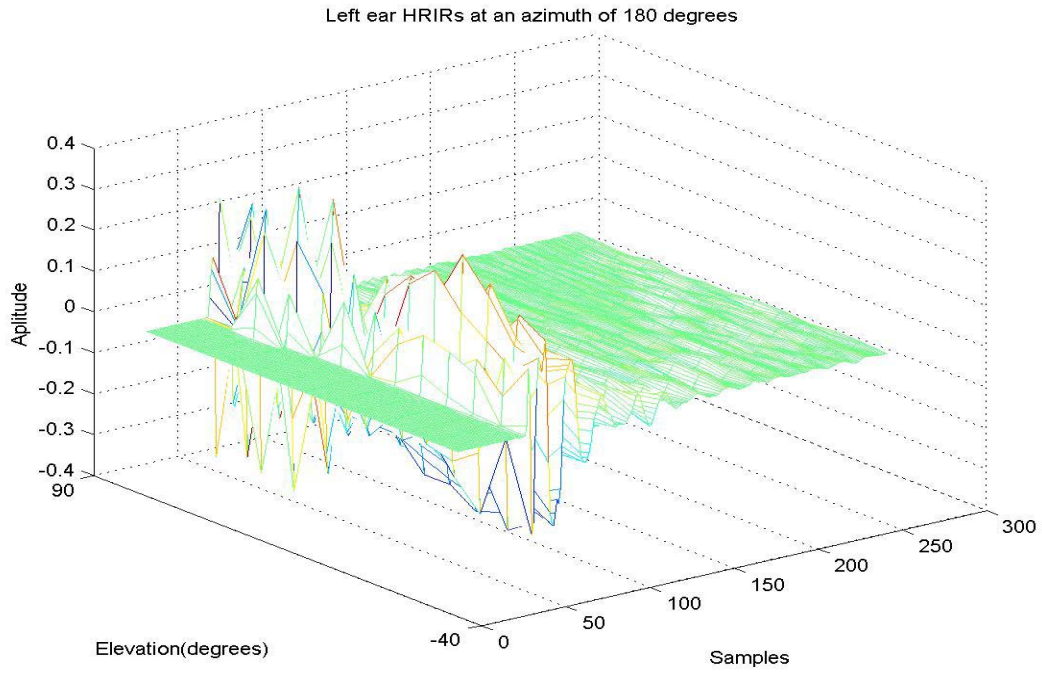

Figure 3.11 Left ear HRIRs at an azimuth of 180 degrees (on the Median Plane)

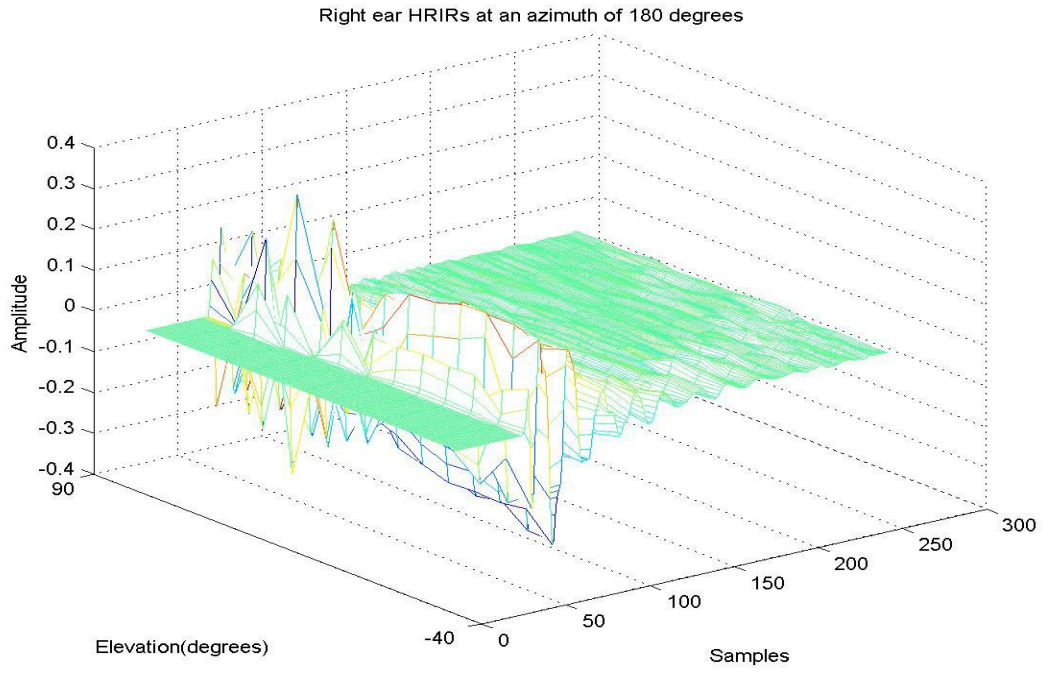

Figure 3.12 Right ear HRIRs at an azimuth of 180 degrees (on the Median Plane)

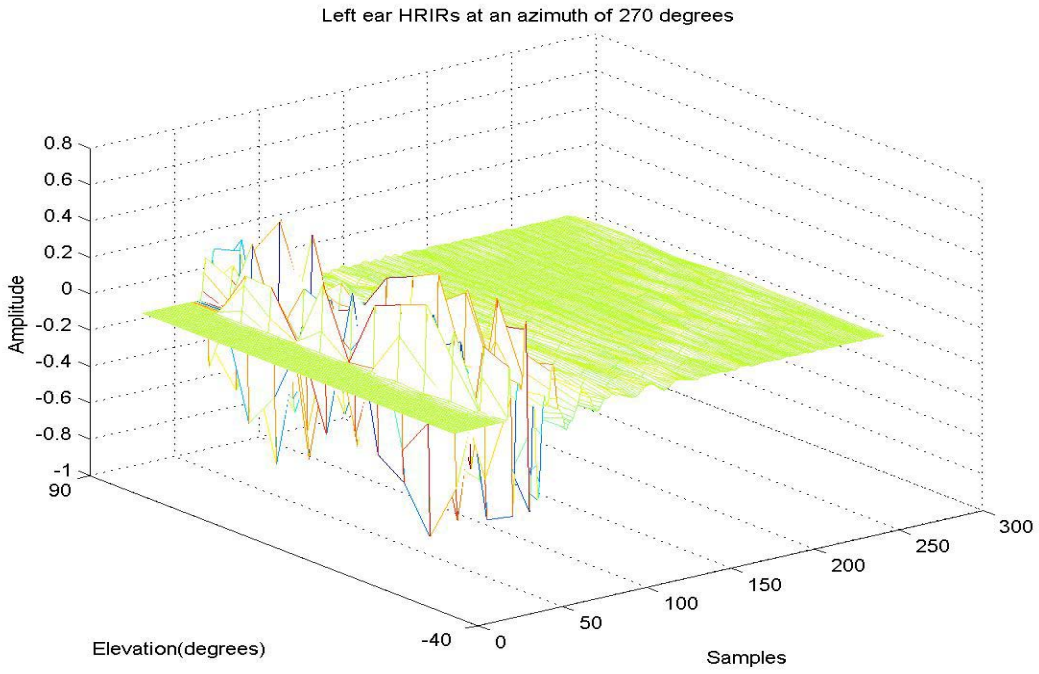

Figure 3.13 Left ear HRIRs at an azimuth of 270 degrees (on the Frontal Plane)

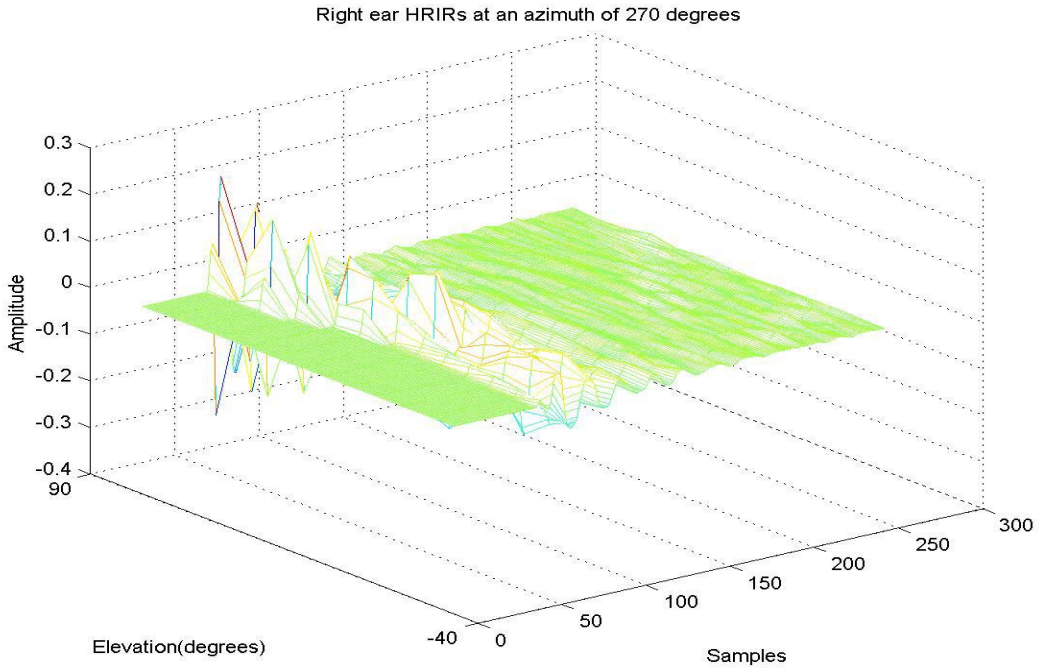

Figure 3.14 Right ear HRIRs at an azimuth of 270 degrees (on the Frontal Plane)

When the HRIRs are located in the median plane, shown in Figures 3.7, 3.8, 3.11, and 3.12, the HRIRs of the left-ear and right-ear are almost identical because the IID and ITD are slight. When the HRIRs are located in the frontal plane, the difference between the left and right ear amplitudes is quite obvious. The comparison reveals that the impulse response for the closer ear is generally more intense (higher amplitude) than the impulse response for the distant ear.

3.3 Frequency Domain Representation of HRTFs

The frequency domain representation of HRTFs helps to find spectral patterns and features, such as peaks and notches, within an individual frequency response or a number of frequency responses. Figures 3.15 and 3.16 represent the HRTFs in the Horizontal Plane. Figures 3.17 and 3.18 represent the HRTFs in the Median Plane. Those plots show that the magnitudes of HRTFs vary tremendously across frequency. In Figure 3.15, as expected, the response reaches its greatest when the source is at 270° and into the left ear, and weakest when the source is at 90° on the opposite side of the head. For the HRTFs of the right ear, as shown in Figure 3.16, the greatest response occurs at 90° and 270° for the weakest.

The elevation effect [11] can be seen in the HRTFs in the median plane. For example, in Figure 3.17, there is a pinna notch at 6 kHz and it shifts towards 9 kHz in frequency as elevation increase. Also, there is a small peak at 10 kHz for low elevations, and this peak goes flat with higher elevations.

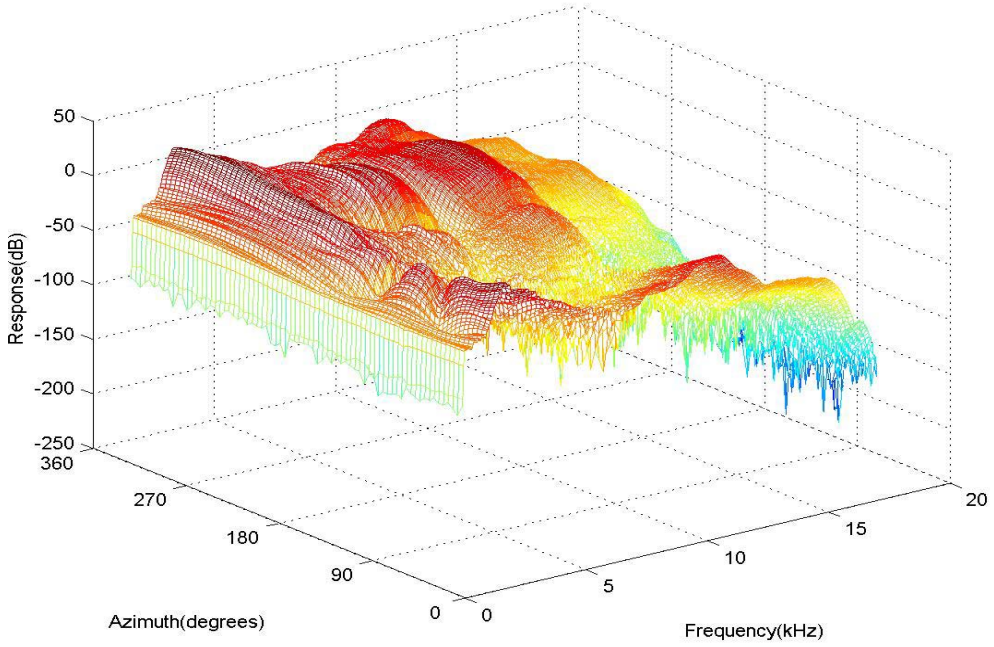

Figure 3.15 The HRTFs of the left ear as the source moves in the Horizontal Plane

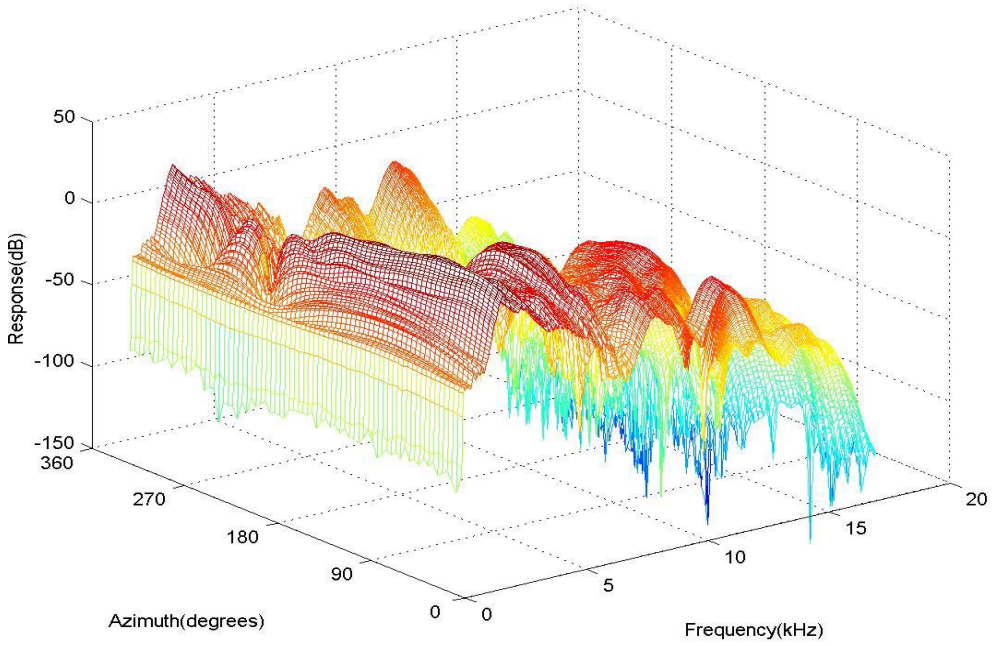

Figure 3.16 The HRTFs of the right ear as the source moves in the Horizontal Plane

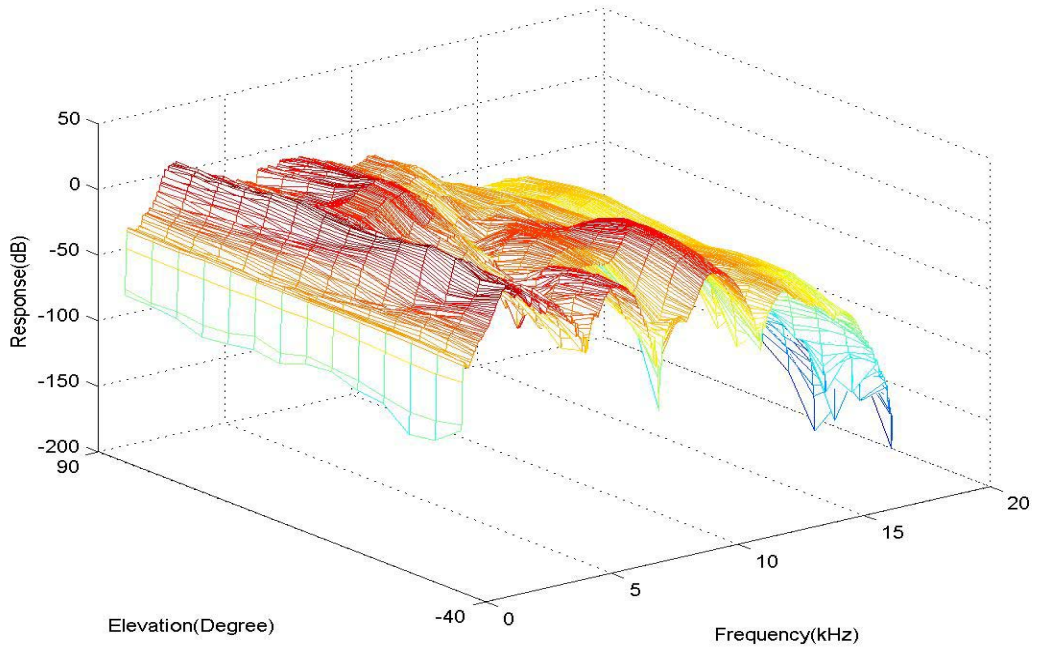

Figure 3.17 The HRTFs of the left ear as the source moves in the Median Plane

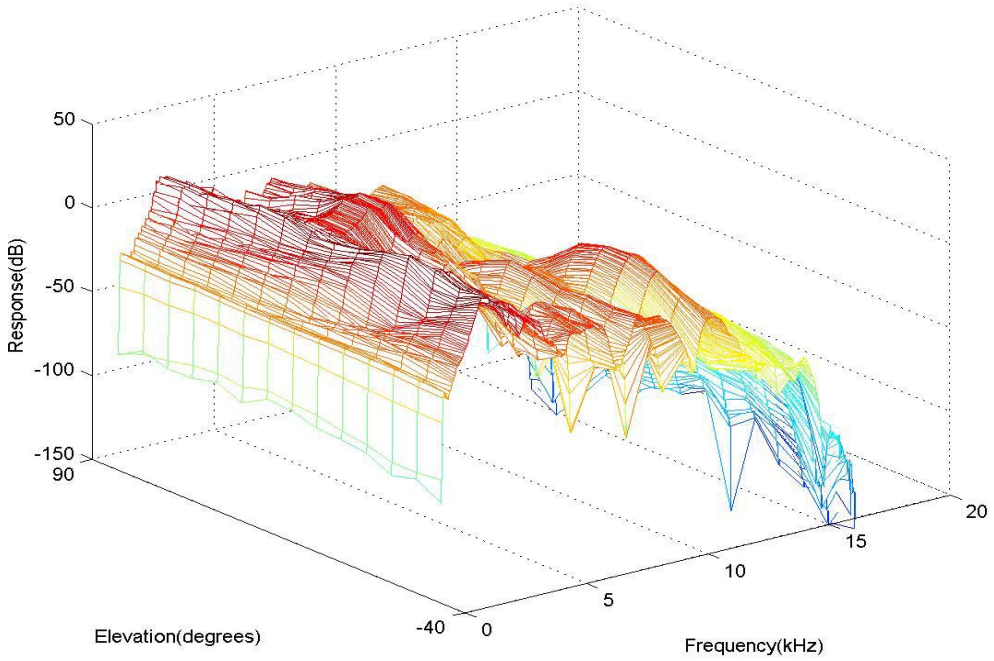

Figure 3.18 The HRTFs of the right ear as the source moves in the Median Plane

The HRTF plays a crucial role in a spatial sound system. To better understand 3D sound synthesis, a thorough analysis of the HRTF was presented in this chapter. In next chapter, a 3D sound system will be simulated using the HRTF database discussed above.

Chapter 4

3D Sound Reproduction

In the former chapters, localization cues and the HRTF were introduced in detail. By manipulating these cues, it is possible to change the apparent location of a sound in space. In this chapter, a simple 3D sound system is simulated by modifying a mono source with measured HRTFs and digital signal processing techniques.

Basically, there are two types of stereo reproduction of 3D sound, headphone reproduction and loudspeaker reproduction. Since the implementation of headphone reproduction is less complicated than loudspeaker reproduction, and since the purpose of this paper is to demonstrate some principal concepts of 3D sound, a 3D sound system with headphone reproduction is simulated. The only considerable computational burden is the convolution of the HRTF filter coefficients and the input sound.

Figure 4.1 shows a 3D system using delay chips, amplifiers, and digital FIR filters to simulate the three major localization cues: ITD, IID, and HRTFs. The major advantage of the system in Figure 4.1 is its simplicity.

A mono sound is placed into two parallel channels, individually delayed, and then amplified in both channels. The delay (ITD) and the gain (IID) are controlled by the interaural delay and gain database. The pre-processed signals are then fed into a pair of HRTF filters whose coefficients are controlled by the HRTF database. Since the size of the HRTF is 128-bytes, convolution in the frequency domain is much faster than in the

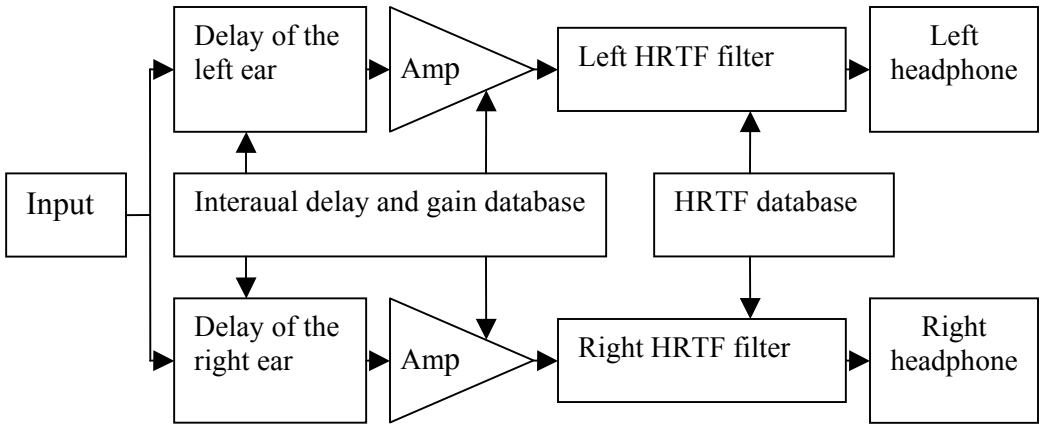

Figure 4.1 Simple implementation of 3D sound by headphone reproduction

time domain, so the convolution is done in the frequency domain in this simulation.

The two databases in Figure 4.1 are actually associated with a head tracking system consisting of sensors and computer(s). A head tracking system detects the listener's head movement, calculates the appropriate ITD and IID values, and chooses the corresponding HRTF filters from the HRTF database. This makes an adaptive 3D sound system in which the spatial information is updated simultaneously as the listener moves.

In this simulation, directions of a sound source are arbitrarily chosen, and the spatial information is calculated afterwards because the head tracking system is rather complex. The purpose of this 3D sound simulation is to focus on basic 3D sound concepts. Though head tracking is not employed in this 3D sound system, it is a very important part in most virtual reality applications.

4.1 Interaural Time Difference

In spatial hearing, azimuthal position is mainly determined by the ITD which is rather independent of frequency. If the distance between two eardrums is *2d* and the azimuth angle (φ) of the sound source is known, the ITD can be determined practically by a simple formula due to Woodworth [12]:

$$ITD = \frac{d}{c}(\varphi + \sin \varphi) \qquad (4.1)$$

where *c* is the speed of sound, *c* = 384 m/s at a room temperature of 24° C at sea level, and the angle φ is recorded from 0° to 360° with equal sized increments of 6°.

The number of delay samples of the two channels can then be calculated mathematically knowing the ITD and the time between sound samples. Since the sampling rate F_s of the *tone.wav* and *step.wav* files is 44.1 kHz, the number of delay samples is:

$$n = ITD \times F_s = \frac{dF_s}{c}(\varphi + \sin \varphi) \qquad (4.2)$$

4.2 Interaural Intensity Difference

Interaural time and phase differences (ITD) are dominant for low-frequency tones (below 1.5 kHz), whereas interaural intensity differences (IID) are dominant for signals above 1.5 kHz. IIDs arise primarily due to the obstruction of the high frequency signals to the ears by the head and torso. The amount of attenuation varies with frequency. For low frequencies, say below 1.5 kHz, IIDs are negligible due to diffraction. For high frequencies, IIDs can reach up to 20 dB. In this application, the test sounds were chosen with most of the frequency components below 1.5 kHz. In this way the high frequency

effect on IIDs can be neglected and the inverse-square law:

$$Intensity \propto \frac{1}{d^2} \tag{4.3}$$

can be treated as the main IID factor. Let I_L and I_R represent the intensity of the left and right channels. IID calculations should be made for each channel as in Eq. 2.1

4.3 Frequency Domain Convolution

Filtering with HRTFs is a highly computational task. In this application, a long data sequence is to be filtered by an FIR filter. With a high data rate (44.1Kbytes/second), it is normally hard for a computer or a real 3D sound system to have sufficient memory to simultaneously hold the entire signal to be processed. Also, there is a real time constraint which requires the signal to be processed segment-by-segment. To satisfy the requirements, the *overlap-add-method* for frequency domain convolution is adopted "The *overlap-add-method* is based on a fundamental technique in DSP; (1) decompose the signal into simple components, (2) process each of the components in some useful way, and (3) recombine the processed components into the final signal."[13]. In MATLAB, the function FFTFILT filters data using the efficient FFT-based method of the *overlap-add-method*.

In this experiment, all the sound files used, including the original mono sounds and the stereo sounds, are in the WAV format. The WAV file format is a subset of Microsoft's RIFF specification for the storage of multimedia files. A WAV file is made up of three parts. The RIFF part is 12 bytes long, the FMT part is 24 bytes long, and the DATA part has a variable length depending on the number of sound samples. [14] In MATLAB, the

function WAVREAD can read a Microsoft WAV sound file and change the DATA part of a WAV file into a matrix, so the sound data can be analyzed, modified, and visualized. WAVWRITE can write the modified data (matrix) into a Microsoft WAV sound file with a specified sampling rate. After a two-channel WAV file is created, some popular music players like Jukebox or Winamp can play the sound file. Also, in MATLAB, there is a function called WAVPLAY, which can change the two-column matrix into a recorded sound and play it on a PC-based audio output device.

4.4 Experimental Results

In the experiments of this 3D sound system, a 1 kHz tone and a sound of someone walking were processed to create a moving tone and steps. In the frequency domain, sound signals from both the left and right channels were compared with its original mono version. Figures 4.2- 4.4.11 show that at different azimuth angels, the 3D sound changes its intensity level and its frequency components.

Finally, the 3D sound is played into a listener's ears. In a real 3D sound system, there might be differences between the real sound source and the perceived sound image, and for different people, different sounds may be heard There is no mathematical or engineering standard to evaluate the quality of the 3D sound and the best judge is the listener's ears.

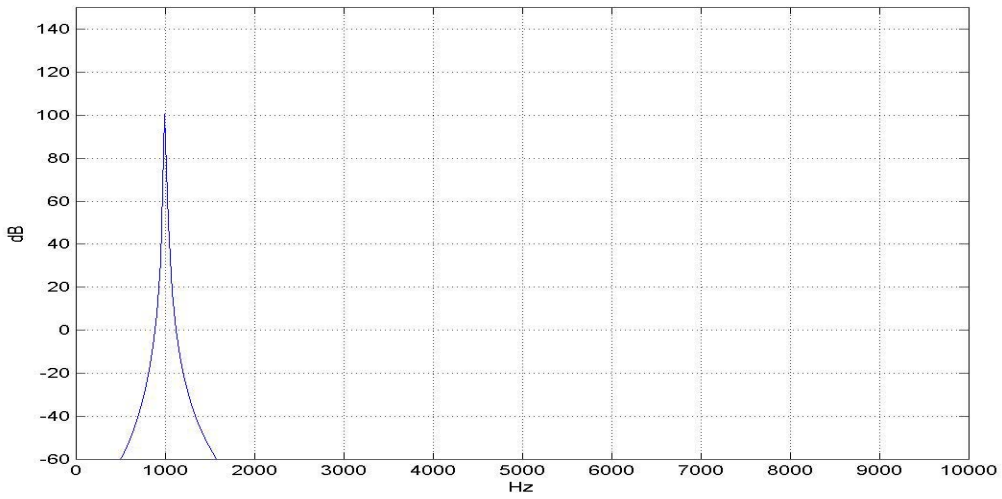

Figure 4.2 Original tone

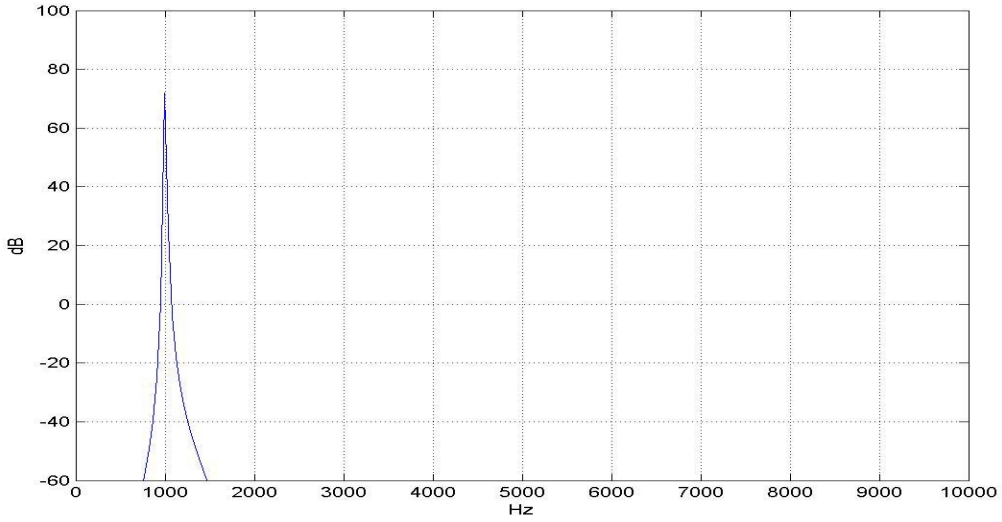

Figure 4.3 Resulting tone of the left channel at $\varphi = 0°$

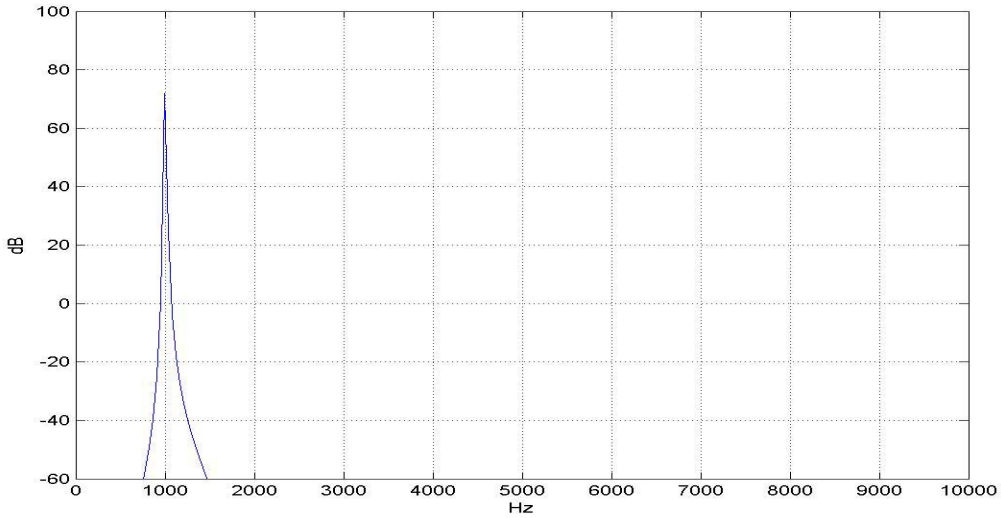

Figure 4.4 Resulting tone of the right channel at $\varphi = 0°$

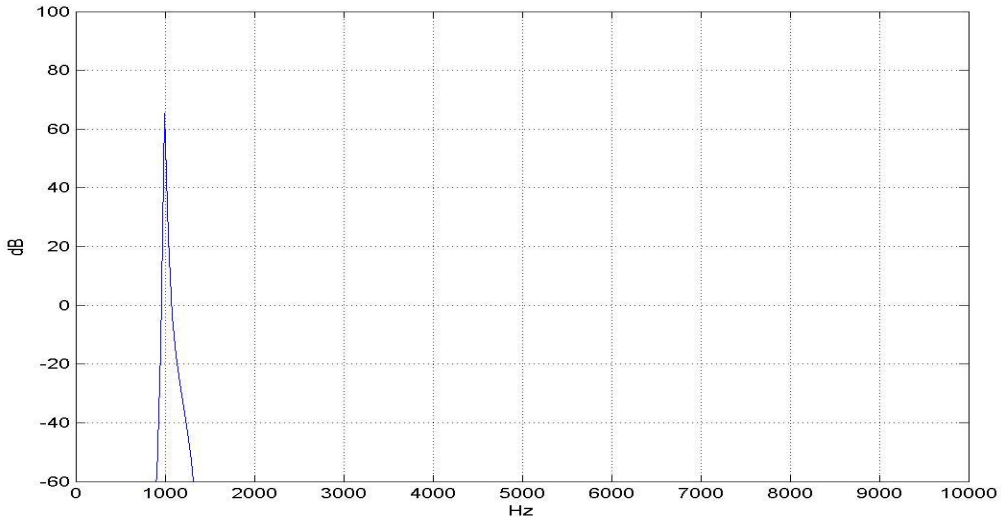

Figure 4.5 Resulting tone of the left channel at $\varphi = 90°$

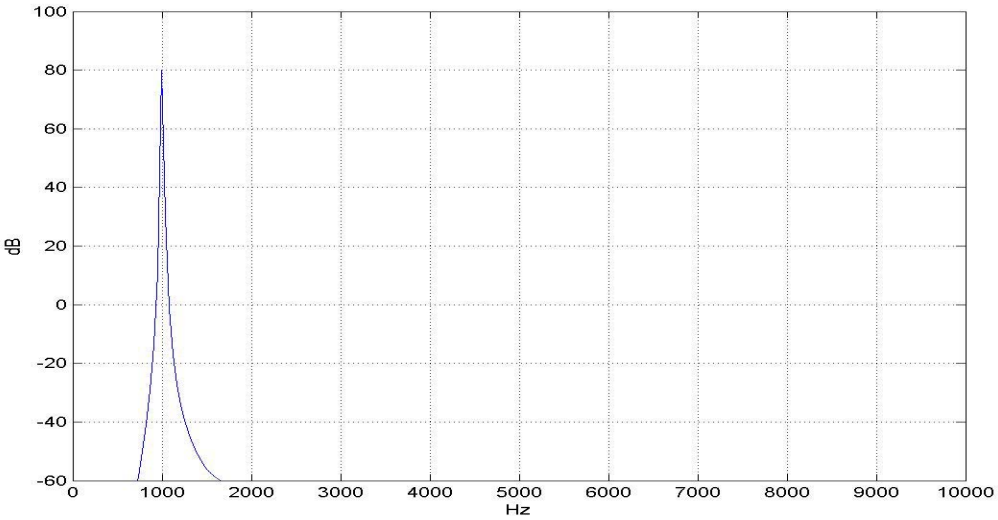

Figure 4.6 Resulting tone of the right channel at $\varphi = 90°$

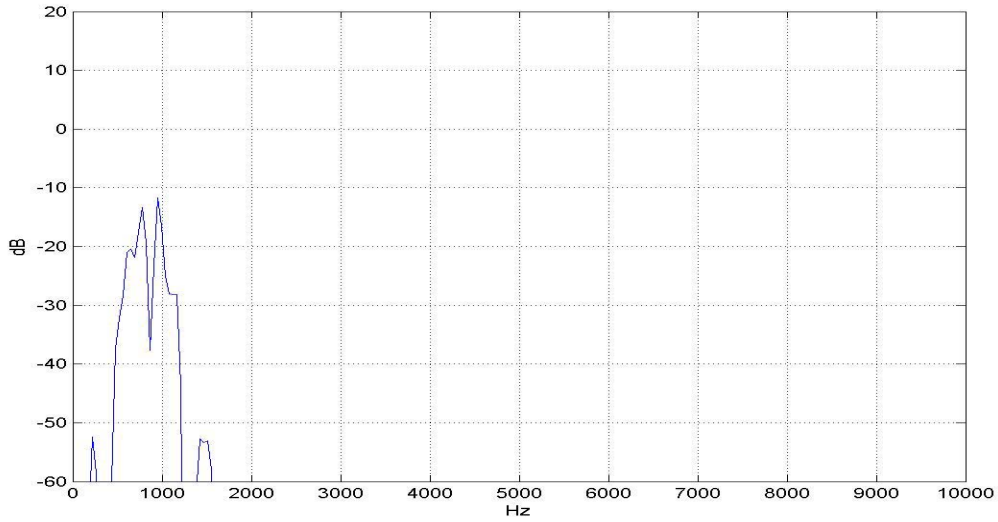

Figure 4.7 Original mono sound of someone walking (steps)

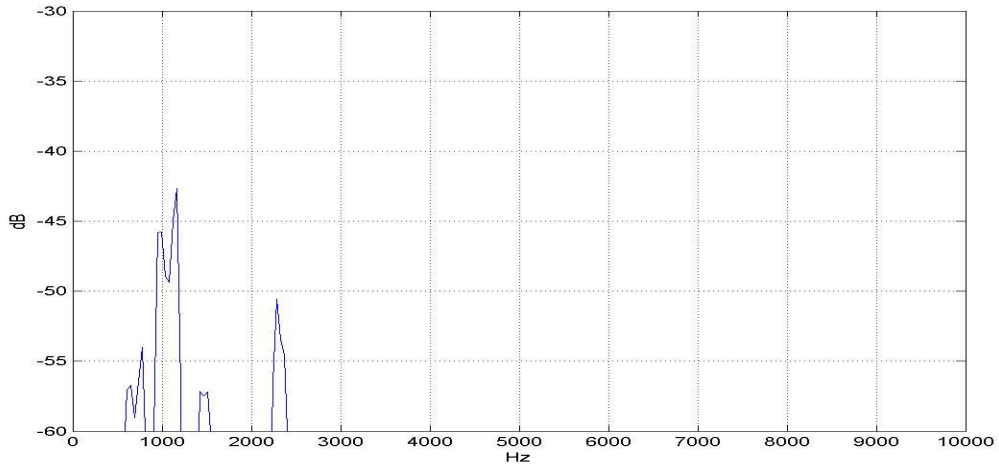

Figure 4.8 Resulting step sound of the left channel at $\varphi = 0°$

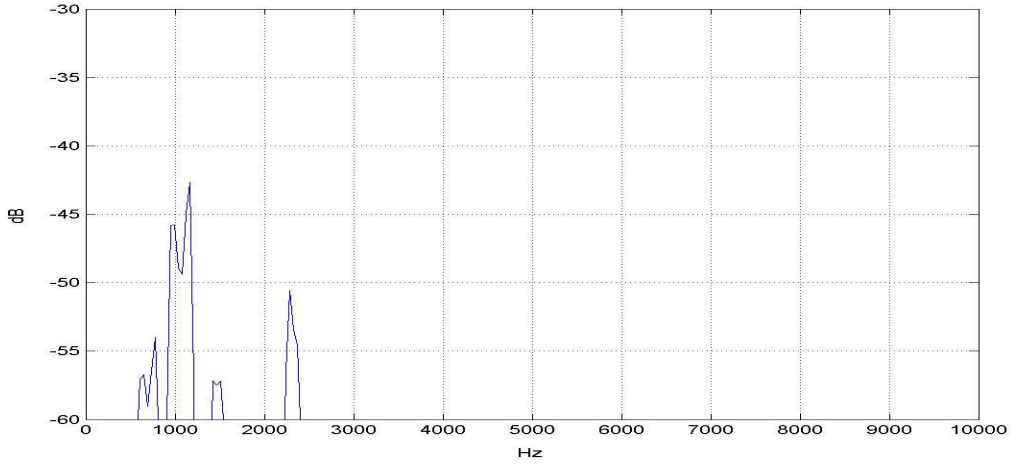

Figure 4.9 Resulting step sound of the right channel at $\varphi = 0°$

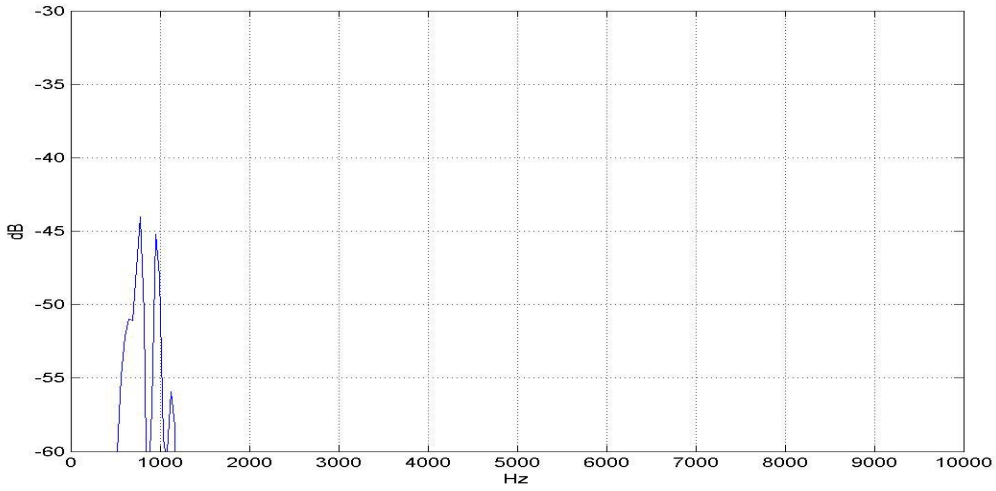

Figure 4.10 Resulting step sound of the left channel at $\varphi = 90°$

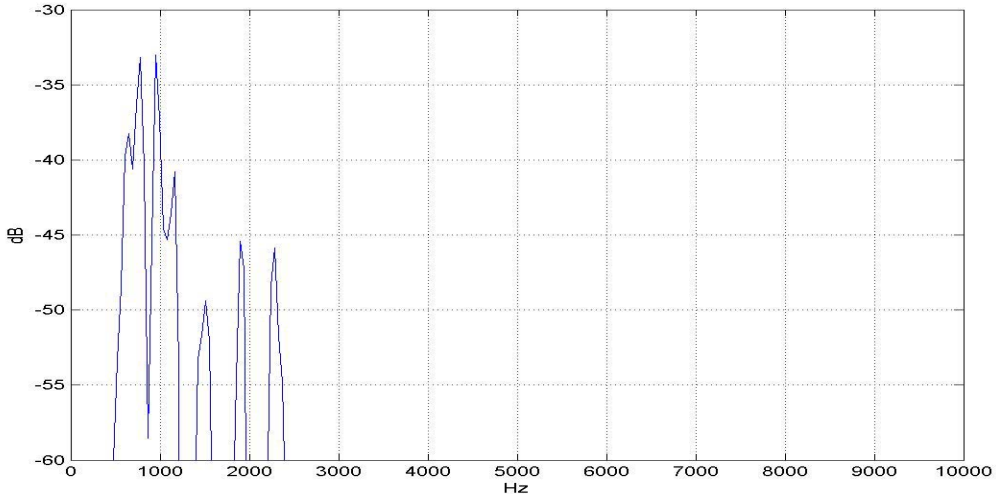

Figure 4.11 Resulting step sound of the right channel at $\varphi = 90°$

Chapter 5

Summary, Conclusions and Future Work

In this thesis some basic 3D sound concepts and a real-time sound reproduction method have been discussed. An experiment of producing 3D sound has also been implemented. The 3D effect of the spatial sound is reasonably good when it is designed to move around a listener's head.

In real applications, a listener perceives a sound image created by headphone reproduction as inside his head. With ITD and IID cues, sound images shift left and right along the interaural axis, but still within the head. Some researchers have "discovered that front/back discrimination can be improved through modifications to HRTFs that exaggerate front/back spectral differences". [5] A better sound effect can be achieved by loudspeaker reproduction in which the sound images are perceived as outside the head and frontal images can easily be recognized from rear images. Actually, a headphone reproduction 3D sound system, with only directional filters and stereo headphones, like the one shown as Figure 4.1, is hardly sufficient to achieve a true 3D sound environment. Most of the current commercial 3D sound productions use a loudspeaker reproduction method that includes more complicated cross-talk cancellation techniques. Cross-talk cancellation is used to diminish the sound change between the loudspeakers to the ears.

As mentioned in the last chapter, the sound image sometimes might not locate the position where it is theoretically supposed to be. Due to the lack of ability of localization

error analysis, the accuracy of 3D sound reproduction cannot be measured. Future research could use a more detailed objective mathematical model to determine to accuracy as well as a listening test. With the rapid increase in DSP processing power, future research also can combine a head tracking system with a multi-source sound system.

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Appendices

Appendix A

Selected Software Listings

A.1 HRTFdata.m

```
clear
% The original HRTF data is saved in .wav files.
% This code is to create two matrices of HRIRs. Each HRIR has 512 points.
E_40L = zeros(512, 56 );
E_40L( :, 1) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\L-40e000a.wav');
E_40L( :, 2) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\L-40e006a.wav');
E_40L( :, 3) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\L-40e013a.wav');
E_40L( :, 4) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\L-40e019a.wav');
E_40L( :, 5) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\L-40e026a.wav');
E_40L( :, 6) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\L-40e032a.wav');
E_40L( :, 7) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\L-40e039a.wav');
E_40L( :, 8) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\L-40e045a.wav');
E_40L( :, 9) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\L-40e051a.wav');
E_40L( :, 10) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\L-40e058a.wav');
E_40L( :, 11) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\L-40e064a.wav');
E_40L( :, 12) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\L-40e071a.wav');
E_40L( :, 13) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\L-40e077a.wav');
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```

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E_40L( :, 33) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\L-40e206a.wav');
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E_30L( :, 4) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\L-30e018a.wav');
E_30L( :, 5) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\L-30e024a.wav');
E_30L( :, 6) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\L-30e030a.wav');
E_30L( :, 7) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\L-30e036a.wav');
E_30L( :, 8) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\L-30e042a.wav');
E_30L( :, 9) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\L-30e048a.wav');
E_30L( :, 10) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\L-30e054a.wav');
E_30L( :, 11) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\L-30e060a.wav');
E_30L( :, 12) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\L-30e066a.wav');
E_30L( :, 13) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\L-30e072a.wav');
E_30L( :, 14) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\L-30e078a.wav');
E_30L( :, 15) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\L-30e084a.wav');
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E_30L( :, 16) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\L-30e090a.wav');
E_30L( :, 17) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\L-30e096a.wav');
E_30L( :, 18) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\L-30e102a.wav');
E_30L( :, 19) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\L-30e108a.wav');
E_30L( :, 20) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\L-30e114a.wav');
E_30L( :, 21) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\L-30e120a.wav');
E_30L( :, 22) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\L-30e126a.wav');
E_30L( :, 23) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\L-30e132a.wav');
E_30L( :, 24) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\L-30e138a.wav');
E_30L( :, 25) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\L-30e144a.wav');
E_30L( :, 26) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\L-30e150a.wav');
E_30L( :, 27) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\L-30e156a.wav');
E_30L( :, 28) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\L-30e162a.wav');
E_30L( :, 29) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\L-30e168a.wav');
E_30L( :, 30) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\L-30e174a.wav');
E_30L( :, 31) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\L-30e180a.wav');
E_30L( :, 32) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\L-30e186a.wav');
E_30L( :, 33) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\L-30e192a.wav');
E_30L( :, 34) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\L-30e198a.wav');
E_30L( :, 35) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\L-30e204a.wav');
E_30L( :, 36) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\L-30e210a.wav');
E_30L( :, 37) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\L-30e216a.wav');
E_30L( :, 38) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\L-30e222a.wav');
E_30L( :, 39) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\L-30e228a.wav');
E_30L( :, 40) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\L-30e234a.wav');
E_30L( :, 41) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\L-30e240a.wav');
E_30L( :, 42) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\L-30e246a.wav');
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E_30L( :, 43) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\L-30e252a.wav');
E_30L( :, 44) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\L-30e258a.wav');
E_30L( :, 45) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\L-30e264a.wav');
E_30L( :, 46) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\L-30e270a.wav');
E_30L( :, 47) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\L-30e276a.wav');
E_30L( :, 48) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\L-30e282a.wav');
E_30L( :, 49) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\L-30e288a.wav');
E_30L( :, 50) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\L-30e294a.wav');
E_30L( :, 51) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\L-30e300a.wav');
E_30L( :, 52) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\L-30e306a.wav');
E_30L( :, 53) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\L-30e312a.wav');
E_30L( :, 54) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\L-30e318a.wav');
E_30L( :, 55) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\L-30e324a.wav');
E_30L( :, 56) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\L-30e330a.wav');
E_30L( :, 57) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\L-30e336a.wav');
E_30L( :, 58) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\L-30e342a.wav');
E_30L( :, 59) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\L-30e348a.wav');
E_30L( :, 60) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\L-30e354a.wav');


E_20L = zeros(512, 72 );
E_20L( :, 1) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e000a.wav');
E_20L( :, 2) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e005a.wav');
E_20L( :, 3) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e010a.wav');
E_20L( :, 4) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e015a.wav');
E_20L( :, 5) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e020a.wav');
E_20L( :, 6) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e025a.wav');
E_20L( :, 7) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e030a.wav');
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E_20L( :, 8) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e035a.wav');
E_20L( :, 9) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e040a.wav');
E_20L( :, 10) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e045a.wav');
E_20L( :, 11) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e050a.wav');
E_20L( :, 12) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e055a.wav');
E_20L( :, 13) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e060a.wav');
E_20L( :, 14) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e065a.wav');
E_20L( :, 15) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e070a.wav');
E_20L( :, 16) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e075a.wav');
E_20L( :, 17) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e080a.wav');
E_20L( :, 18) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e085a.wav');
E_20L( :, 19) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e090a.wav');
E_20L( :, 20) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e095a.wav');
E_20L( :, 21) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e100a.wav');
E_20L( :, 22) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e105a.wav');
E_20L( :, 23) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e110a.wav');
E_20L( :, 24) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e115a.wav');
E_20L( :, 25) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e120a.wav');
E_20L( :, 26) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e125a.wav');
E_20L( :, 27) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e130a.wav');
E_20L( :, 28) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e135a.wav');
E_20L( :, 29) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e140a.wav');
E_20L( :, 30) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e145a.wav');
E_20L( :, 31) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e150a.wav');
E_20L( :, 32) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e155a.wav');
E_20L( :, 33) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e160a.wav');
E_20L( :, 34) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e165a.wav');
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E_20L( :, 35) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e170a.wav');
E_20L( :, 36) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e175a.wav');
E_20L( :, 37) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e180a.wav');
E_20L( :, 38) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e185a.wav');
E_20L( :, 39) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e190a.wav');
E_20L( :, 40) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e195a.wav');
E_20L( :, 41) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e200a.wav');
E_20L( :, 42) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e205a.wav');
E_20L( :, 43) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e210a.wav');
E_20L( :, 44) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e215a.wav');
E_20L( :, 45) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e220a.wav');
E_20L( :, 46) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e225a.wav');
E_20L( :, 47) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e230a.wav');
E_20L( :, 48) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e235a.wav');
E_20L( :, 49) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e240a.wav');
E_20L( :, 50) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e245a.wav');
E_20L( :, 51) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e250a.wav');
E_20L( :, 52) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e255a.wav');
E_20L( :, 53) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e260a.wav');
E_20L( :, 54) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e265a.wav');
E_20L( :, 55) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e270a.wav');
E_20L( :, 56) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e275a.wav');
E_20L( :, 57) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e280a.wav');
E_20L( :, 58) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e285a.wav');
E_20L( :, 59) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e290a.wav');
E_20L( :, 60) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e295a.wav');
E_20L( :, 61) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e300a.wav');
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E_20L( :, 62) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e305a.wav');
E_20L( :, 63) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e310a.wav');
E_20L( :, 64) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e315a.wav');
E_20L( :, 65) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e320a.wav');
E_20L( :, 66) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e325a.wav');
E_20L( :, 67) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e330a.wav');
E_20L( :, 68) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e335a.wav');
E_20L( :, 69) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e340a.wav');
E_20L( :, 70) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e345a.wav');
E_20L( :, 71) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e350a.wav');
E_20L( :, 72) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\L-20e355a.wav');


E_10L = zeros(512, 72 );
E_10L( :, 1) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e000a.wav');
E_10L( :, 2) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e005a.wav');
E_10L( :, 3) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e010a.wav');
E_10L( :, 4) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e015a.wav');
E_10L( :, 5) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e020a.wav');
E_10L( :, 6) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e025a.wav');
E_10L( :, 7) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e030a.wav');
E_10L( :, 8) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e035a.wav');
E_10L( :, 9) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e040a.wav');
E_10L( :, 10) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e045a.wav');
E_10L( :, 11) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e050a.wav');
E_10L( :, 12) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e055a.wav');
E_10L( :, 13) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e060a.wav');
E_10L( :, 14) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e065a.wav');
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E_10L( :, 15) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e070a.wav');
E_10L( :, 16) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e075a.wav');
E_10L( :, 17) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e080a.wav');
E_10L( :, 18) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e085a.wav');
E_10L( :, 19) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e090a.wav');
E_10L( :, 20) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e095a.wav');
E_10L( :, 21) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e100a.wav');
E_10L( :, 22) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e105a.wav');
E_10L( :, 23) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e110a.wav');
E_10L( :, 24) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e115a.wav');
E_10L( :, 25) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e120a.wav');
E_10L( :, 26) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e125a.wav');
E_10L( :, 27) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e130a.wav');
E_10L( :, 28) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e135a.wav');
E_10L( :, 29) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e140a.wav');
E_10L( :, 30) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e145a.wav');
E_10L( :, 31) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e150a.wav');
E_10L( :, 32) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e155a.wav');
E_10L( :, 33) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e160a.wav');
E_10L( :, 34) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e165a.wav');
E_10L( :, 35) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e170a.wav');
E_10L( :, 36) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e175a.wav');
E_10L( :, 37) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e180a.wav');
E_10L( :, 38) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e185a.wav');
E_10L( :, 39) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e190a.wav');
E_10L( :, 40) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e195a.wav');
E_10L( :, 41) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e200a.wav');
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E_10L( :, 44) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e215a.wav');
E_10L( :, 45) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e220a.wav');
E_10L( :, 46) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e225a.wav');
E_10L( :, 47) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e230a.wav');
E_10L( :, 48) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e235a.wav');
E_10L( :, 49) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e240a.wav');
E_10L( :, 50) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e245a.wav');
E_10L( :, 51) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e250a.wav');
E_10L( :, 52) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e255a.wav');
E_10L( :, 53) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e260a.wav');
E_10L( :, 54) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e265a.wav');
E_10L( :, 55) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e270a.wav');
E_10L( :, 56) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e275a.wav');
E_10L( :, 57) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e280a.wav');
E_10L( :, 58) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e285a.wav');
E_10L( :, 59) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e290a.wav');
E_10L( :, 60) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e295a.wav');
E_10L( :, 61) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e300a.wav');
E_10L( :, 62) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e305a.wav');
E_10L( :, 63) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e310a.wav');
E_10L( :, 64) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e315a.wav');
E_10L( :, 65) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e320a.wav');
E_10L( :, 66) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e325a.wav');
E_10L( :, 67) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e330a.wav');
E_10L( :, 68) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e335a.wav');
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E_10L( :, 69) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e340a.wav');
E_10L( :, 70) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e345a.wav');
E_10L( :, 71) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e350a.wav');
E_10L( :, 72) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\L-10e355a.wav');



E_00L = zeros(512, 72 );
E_00L( :, 1) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\L0e000a.wav');
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E_00L( :, 3) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\L0e010a.wav');
E_00L( :, 4) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\L0e015a.wav');
E_00L( :, 5) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\L0e020a.wav');
E_00L( :, 6) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\L0e025a.wav');
E_00L( :, 7) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\L0e030a.wav');
E_00L( :, 8) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\L0e035a.wav');
E_00L( :, 9) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\L0e040a.wav');
E_00L( :, 10) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\L0e045a.wav');
E_00L( :, 11) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\L0e050a.wav');
E_00L( :, 12) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\L0e055a.wav');
E_00L( :, 13) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\L0e060a.wav');
E_00L( :, 14) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\L0e065a.wav');
E_00L( :, 15) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\L0e070a.wav');
E_00L( :, 16) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\L0e075a.wav');
E_00L( :, 17) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\L0e080a.wav');
E_00L( :, 18) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\L0e085a.wav');
E_00L( :, 19) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\L0e090a.wav');
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E_00L( :, 21) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\L0e100a.wav');
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E_00L( :, 22) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\L0e105a.wav');
E_00L( :, 23) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\L0e110a.wav');
E_00L( :, 24) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\L0e115a.wav');
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E_00L( :, 26) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\L0e125a.wav');
E_00L( :, 27) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\L0e130a.wav');
E_00L( :, 28) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\L0e135a.wav');
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E_00L( :, 32) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\L0e155a.wav');
E_00L( :, 33) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\L0e160a.wav');
E_00L( :, 34) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\L0e165a.wav');
E_00L( :, 35) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\L0e170a.wav');
E_00L( :, 36) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\L0e175a.wav');
E_00L( :, 37) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\L0e180a.wav');
E_00L( :, 38) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\L0e185a.wav');
E_00L( :, 39) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\L0e190a.wav');
E_00L( :, 40) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\L0e195a.wav');
E_00L( :, 41) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\L0e200a.wav');
E_00L( :, 42) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\L0e205a.wav');
E_00L( :, 43) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\L0e210a.wav');
E_00L( :, 44) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\L0e215a.wav');
E_00L( :, 45) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\L0e220a.wav');
E_00L( :, 46) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\L0e225a.wav');
E_00L( :, 47) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\L0e230a.wav');
E_00L( :, 48) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\L0e235a.wav');
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E_00L( :, 49) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\L0e240a.wav');
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E_00L( :, 51) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\L0e250a.wav');
E_00L( :, 52) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\L0e255a.wav');
E_00L( :, 53) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\L0e260a.wav');
E_00L( :, 54) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\L0e265a.wav');
E_00L( :, 55) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\L0e270a.wav');
E_00L( :, 56) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\L0e275a.wav');
E_00L( :, 57) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\L0e280a.wav');
E_00L( :, 58) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\L0e285a.wav');
E_00L( :, 59) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\L0e290a.wav');
E_00L( :, 60) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\L0e295a.wav');
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E_00L( :, 63) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\L0e310a.wav');
E_00L( :, 64) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\L0e315a.wav');
E_00L( :, 65) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\L0e320a.wav');
E_00L( :, 66) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\L0e325a.wav');
E_00L( :, 67) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\L0e330a.wav');
E_00L( :, 68) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\L0e335a.wav');
E_00L( :, 69) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\L0e340a.wav');
E_00L( :, 70) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\L0e345a.wav');
E_00L( :, 71) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\L0e350a.wav');
E_00L( :, 72) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\L0e355a.wav');



E10L = zeros(512, 72 );
E10L( :, 1) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e000a.wav');
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E10L( :, 2) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e005a.wav');
E10L( :, 3) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e010a.wav');
E10L( :, 4) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e015a.wav');
E10L( :, 5) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e020a.wav');
E10L( :, 6) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e025a.wav');
E10L( :, 7) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e030a.wav');
E10L( :, 8) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e035a.wav');
E10L( :, 9) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e040a.wav');
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E10L( :, 11) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e050a.wav');
E10L( :, 12) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e055a.wav');
E10L( :, 13) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e060a.wav');
E10L( :, 14) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e065a.wav');
E10L( :, 15) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e070a.wav');
E10L( :, 16) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e075a.wav');
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E10L( :, 18) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e085a.wav');
E10L( :, 19) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e090a.wav');
E10L( :, 20) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e095a.wav');
E10L( :, 21) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e100a.wav');
E10L( :, 22) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e105a.wav');
E10L( :, 23) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e110a.wav');
E10L( :, 24) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e115a.wav');
E10L( :, 25) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e120a.wav');
E10L( :, 26) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e125a.wav');
E10L( :, 27) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e130a.wav');
E10L( :, 28) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e135a.wav');
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E10L( :, 29) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e140a.wav');
E10L( :, 30) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e145a.wav');
E10L( :, 31) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e150a.wav');
E10L( :, 32) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e155a.wav');
E10L( :, 33) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e160a.wav');
E10L( :, 34) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e165a.wav');
E10L( :, 35) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e170a.wav');
E10L( :, 36) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e175a.wav');
E10L( :, 37) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e180a.wav');
E10L( :, 38) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e185a.wav');
E10L( :, 39) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e190a.wav');
E10L( :, 40) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e195a.wav');
E10L( :, 41) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e200a.wav');
E10L( :, 42) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e205a.wav');
E10L( :, 43) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e210a.wav');
E10L( :, 44) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e215a.wav');
E10L( :, 45) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e220a.wav');
E10L( :, 46) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e225a.wav');
E10L( :, 47) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e230a.wav');
E10L( :, 48) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e235a.wav');
E10L( :, 49) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e240a.wav');
E10L( :, 50) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e245a.wav');
E10L( :, 51) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e250a.wav');
E10L( :, 52) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e255a.wav');
E10L( :, 53) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e260a.wav');
E10L( :, 54) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e265a.wav');
E10L( :, 55) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e270a.wav');
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E10L( :, 56) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e275a.wav');
E10L( :, 57) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e280a.wav');
E10L( :, 58) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e285a.wav');
E10L( :, 59) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e290a.wav');
E10L( :, 60) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e295a.wav');
E10L( :, 61) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e300a.wav');
E10L( :, 62) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e305a.wav');
E10L( :, 63) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e310a.wav');
E10L( :, 64) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e315a.wav');
E10L( :, 65) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e320a.wav');
E10L( :, 66) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e325a.wav');
E10L( :, 67) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e330a.wav');
E10L( :, 68) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e335a.wav');
E10L( :, 69) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e340a.wav');
E10L( :, 70) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e345a.wav');
E10L( :, 71) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e350a.wav');
E10L( :, 72) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\L10e355a.wav');


E20L = zeros(512, 72 );
E20L( :, 1) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e000a.wav');
E20L( :, 2) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e005a.wav');
E20L( :, 3) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e010a.wav');
E20L( :, 4) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e015a.wav');
E20L( :, 5) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e020a.wav');
E20L( :, 6) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e025a.wav');
E20L( :, 7) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e030a.wav');
E20L( :, 8) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e035a.wav');
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E20L( :, 9) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e040a.wav');
E20L( :, 10) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e045a.wav');
E20L( :, 11) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e050a.wav');
E20L( :, 12) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e055a.wav');
E20L( :, 13) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e060a.wav');
E20L( :, 14) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e065a.wav');
E20L( :, 15) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e070a.wav');
E20L( :, 16) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e075a.wav');
E20L( :, 17) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e080a.wav');
E20L( :, 18) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e085a.wav');
E20L( :, 19) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e090a.wav');
E20L( :, 20) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e095a.wav');
E20L( :, 21) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e100a.wav');
E20L( :, 22) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e105a.wav');
E20L( :, 23) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e110a.wav');
E20L( :, 24) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e115a.wav');
E20L( :, 25) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e120a.wav');
E20L( :, 26) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e125a.wav');
E20L( :, 27) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e130a.wav');
E20L( :, 28) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e135a.wav');
E20L( :, 29) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e140a.wav');
E20L( :, 30) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e145a.wav');
E20L( :, 31) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e150a.wav');
E20L( :, 32) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e155a.wav');
E20L( :, 33) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e160a.wav');
E20L( :, 34) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e165a.wav');
E20L( :, 35) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e170a.wav');
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E20L( :, 36) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e175a.wav');
E20L( :, 37) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e180a.wav');
E20L( :, 38) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e185a.wav');
E20L( :, 39) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e190a.wav');
E20L( :, 40) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e195a.wav');
E20L( :, 41) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e200a.wav');
E20L( :, 42) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e205a.wav');
E20L( :, 43) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e210a.wav');
E20L( :, 44) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e215a.wav');
E20L( :, 45) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e220a.wav');
E20L( :, 46) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e225a.wav');
E20L( :, 47) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e230a.wav');
E20L( :, 48) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e235a.wav');
E20L( :, 49) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e240a.wav');
E20L( :, 50) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e245a.wav');
E20L( :, 51) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e250a.wav');
E20L( :, 52) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e255a.wav');
E20L( :, 53) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e260a.wav');
E20L( :, 54) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e265a.wav');
E20L( :, 55) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e270a.wav');
E20L( :, 56) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e275a.wav');
E20L( :, 57) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e280a.wav');
E20L( :, 58) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e285a.wav');
E20L( :, 59) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e290a.wav');
E20L( :, 60) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e295a.wav');
E20L( :, 61) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e300a.wav');
E20L( :, 62) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e305a.wav');
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E20L( :, 63) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e310a.wav');
E20L( :, 64) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e315a.wav');
E20L( :, 65) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e320a.wav');
E20L( :, 66) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e325a.wav');
E20L( :, 67) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e330a.wav');
E20L( :, 68) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e335a.wav');
E20L( :, 69) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e340a.wav');
E20L( :, 70) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e345a.wav');
E20L( :, 71) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e350a.wav');
E20L( :, 72) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\L20e355a.wav');


E30L = zeros(512, 60 );
E30L( :, 1) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\L30e000a.wav');
E30L( :, 2) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\L30e006a.wav');
E30L( :, 3) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\L30e012a.wav');
E30L( :, 4) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\L30e018a.wav');
E30L( :, 5) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\L30e024a.wav');
E30L( :, 6) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\L30e030a.wav');
E30L( :, 7) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\L30e036a.wav');
E30L( :, 8) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\L30e042a.wav');
E30L( :, 9) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\L30e048a.wav');
E30L( :, 10) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\L30e054a.wav');
E30L( :, 11) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\L30e060a.wav');
E30L( :, 12) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\L30e066a.wav');
E30L( :, 13) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\L30e072a.wav');
E30L( :, 14) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\L30e078a.wav');
E30L( :, 15) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\L30e084a.wav');
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E30L( :, 16) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\L30e090a.wav');
E30L( :, 17) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\L30e096a.wav');
E30L( :, 18) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\L30e102a.wav');
E30L( :, 19) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\L30e108a.wav');
E30L( :, 20) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\L30e114a.wav');
E30L( :, 21) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\L30e120a.wav');
E30L( :, 22) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\L30e126a.wav');
E30L( :, 23) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\L30e132a.wav');
E30L( :, 24) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\L30e138a.wav');
E30L( :, 25) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\L30e144a.wav');
E30L( :, 26) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\L30e150a.wav');
E30L( :, 27) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\L30e156a.wav');
E30L( :, 28) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\L30e162a.wav');
E30L( :, 29) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\L30e168a.wav');
E30L( :, 30) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\L30e174a.wav');
E30L( :, 31) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\L30e180a.wav');
E30L( :, 32) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\L30e186a.wav');
E30L( :, 33) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\L30e192a.wav');
E30L( :, 34) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\L30e198a.wav');
E30L( :, 35) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\L30e204a.wav');
E30L( :, 36) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\L30e210a.wav');
E30L( :, 37) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\L30e216a.wav');
E30L( :, 38) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\L30e222a.wav');
E30L( :, 39) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\L30e228a.wav');
E30L( :, 40) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\L30e234a.wav');
E30L( :, 41) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\L30e240a.wav');
E30L( :, 42) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\L30e246a.wav');
```

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E30L( :, 43) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\L30e252a.wav');
E30L( :, 44) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\L30e258a.wav');
E30L( :, 45) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\L30e264a.wav');
E30L( :, 46) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\L30e270a.wav');
E30L( :, 47) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\L30e276a.wav');
E30L( :, 48) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\L30e282a.wav');
E30L( :, 49) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\L30e288a.wav');
E30L( :, 50) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\L30e294a.wav');
E30L( :, 51) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\L30e300a.wav');
E30L( :, 52) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\L30e306a.wav');
E30L( :, 53) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\L30e312a.wav');
E30L( :, 54) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\L30e318a.wav');
E30L( :, 55) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\L30e324a.wav');
E30L( :, 56) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\L30e330a.wav');
E30L( :, 57) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\L30e336a.wav');
E30L( :, 58) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\L30e342a.wav');
E30L( :, 59) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\L30e348a.wav');
E30L( :, 60) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\L30e354a.wav');



E40L = zeros(512, 56 );
E40L( :, 1) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\L40e000a.wav');
E40L( :, 2) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\L40e006a.wav');
E40L( :, 3) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\L40e013a.wav');
E40L( :, 4) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\L40e019a.wav');
E40L( :, 5) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\L40e026a.wav');
E40L( :, 6) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\L40e032a.wav');
E40L( :, 7) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\L40e039a.wav');
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E40L( :, 8) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\L40e045a.wav');
E40L( :, 9) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\L40e051a.wav');
E40L( :, 10) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\L40e058a.wav');
E40L( :, 11) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\L40e064a.wav');
E40L( :, 12) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\L40e071a.wav');
E40L( :, 13) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\L40e077a.wav');
E40L( :, 14) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\L40e084a.wav');
E40L( :, 15) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\L40e090a.wav');
E40L( :, 16) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\L40e096a.wav');
E40L( :, 17) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\L40e103a.wav');
E40L( :, 18) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\L40e109a.wav');
E40L( :, 19) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\L40e116a.wav');
E40L( :, 20) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\L40e122a.wav');
E40L( :, 21) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\L40e129a.wav');
E40L( :, 22) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\L40e135a.wav');
E40L( :, 23) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\L40e141a.wav');
E40L( :, 24) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\L40e148a.wav');
E40L( :, 25) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\L40e154a.wav');
E40L( :, 26) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\L40e161a.wav');
E40L( :, 27) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\L40e167a.wav');
E40L( :, 28) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\L40e174a.wav');
E40L( :, 29) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\L40e180a.wav');
E40L( :, 30) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\L40e186a.wav');
E40L( :, 31) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\L40e193a.wav');
E40L( :, 32) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\L40e199a.wav');
E40L( :, 33) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\L40e206a.wav');
E40L( :, 34) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\L40e212a.wav');
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E40L( :, 35) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\L40e219a.wav');
E40L( :, 36) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\L40e225a.wav');
E40L( :, 37) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\L40e231a.wav');
E40L( :, 38) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\L40e238a.wav');
E40L( :, 39) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\L40e244a.wav');
E40L( :, 40) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\L40e251a.wav');
E40L( :, 41) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\L40e257a.wav');
E40L( :, 42) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\L40e264a.wav');
E40L( :, 43) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\L40e270a.wav');
E40L( :, 44) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\L40e276a.wav');
E40L( :, 45) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\L40e283a.wav');
E40L( :, 46) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\L40e289a.wav');
E40L( :, 47) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\L40e296a.wav');
E40L( :, 48) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\L40e302a.wav');
E40L( :, 49) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\L40e309a.wav');
E40L( :, 50) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\L40e315a.wav');
E40L( :, 51) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\L40e321a.wav');
E40L( :, 52) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\L40e328a.wav');
E40L( :, 53) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\L40e334a.wav');
E40L( :, 54) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\L40e341a.wav');
E40L( :, 55) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\L40e347a.wav');
E40L( :, 56) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\L40e354a.wav');


E50L = zeros(512, 45 );
E50L( :, 1) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\L50e000a.wav');
E50L( :, 2) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\L50e008a.wav');
E50L( :, 3) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\L50e016a.wav');
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E50L( :, 4) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\L50e024a.wav');
E50L( :, 5) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\L50e032a.wav');
E50L( :, 6) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\L50e040a.wav');
E50L( :, 7) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\L50e048a.wav');
E50L( :, 8) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\L50e056a.wav');
E50L( :, 9) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\L50e064a.wav');
E50L( :, 10) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\L50e072a.wav');
E50L( :, 11) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\L50e080a.wav');
E50L( :, 12) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\L50e088a.wav');
E50L( :, 13) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\L50e096a.wav');
E50L( :, 14) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\L50e104a.wav');
E50L( :, 15) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\L50e112a.wav');
E50L( :, 16) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\L50e120a.wav');
E50L( :, 17) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\L50e128a.wav');
E50L( :, 18) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\L50e136a.wav');
E50L( :, 19) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\L50e144a.wav');
E50L( :, 20) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\L50e152a.wav');
E50L( :, 21) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\L50e160a.wav');
E50L( :, 22) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\L50e168a.wav');
E50L( :, 23) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\L50e176a.wav');
E50L( :, 24) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\L50e184a.wav');
E50L( :, 25) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\L50e192a.wav');
E50L( :, 26) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\L50e200a.wav');
E50L( :, 27) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\L50e208a.wav');
E50L( :, 28) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\L50e216a.wav');
E50L( :, 29) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\L50e224a.wav');
E50L( :, 30) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\L50e232a.wav');
```

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E50L( :, 31) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\L50e240a.wav');
E50L( :, 32) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\L50e248a.wav');
E50L( :, 33) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\L50e256a.wav');
E50L( :, 34) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\L50e264a.wav');
E50L( :, 35) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\L50e272a.wav');
E50L( :, 36) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\L50e280a.wav');
E50L( :, 37) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\L50e288a.wav');
E50L( :, 38) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\L50e296a.wav');
E50L( :, 39) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\L50e304a.wav');
E50L( :, 40) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\L50e312a.wav');
E50L( :, 41) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\L50e320a.wav');
E50L( :, 42) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\L50e328a.wav');
E50L( :, 43) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\L50e336a.wav');
E50L( :, 44) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\L50e344a.wav');
E50L( :, 45) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\L50e352a.wav');


E60L = zeros(512, 36);
E60L( :, 1) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\L60e000a.wav');
E60L( :, 2) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\L60e010a.wav');
E60L( :, 3) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\L60e020a.wav');
E60L( :, 4) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\L60e030a.wav');
E60L( :, 5) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\L60e040a.wav');
E60L( :, 6) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\L60e050a.wav');
E60L( :, 7) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\L60e060a.wav');
E60L( :, 8) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\L60e070a.wav');
E60L( :, 9) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\L60e080a.wav');
E60L( :, 10) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\L60e090a.wav');
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E60L( :, 11) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\L60e100a.wav');
E60L( :, 12) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\L60e110a.wav');
E60L( :, 13) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\L60e120a.wav');
E60L( :, 14) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\L60e130a.wav');
E60L( :, 15) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\L60e140a.wav');
E60L( :, 16) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\L60e150a.wav');
E60L( :, 17) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\L60e160a.wav');
E60L( :, 18) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\L60e170a.wav');
E60L( :, 19) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\L60e180a.wav');
E60L( :, 20) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\L60e190a.wav');
E60L( :, 21) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\L60e200a.wav');
E60L( :, 22) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\L60e210a.wav');
E60L( :, 23) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\L60e220a.wav');
E60L( :, 24) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\L60e230a.wav');
E60L( :, 25) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\L60e240a.wav');
E60L( :, 26) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\L60e250a.wav');
E60L( :, 27) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\L60e260a.wav');
E60L( :, 28) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\L60e270a.wav');
E60L( :, 29) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\L60e280a.wav');
E60L( :, 30) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\L60e290a.wav');
E60L( :, 31) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\L60e300a.wav');
E60L( :, 32) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\L60e310a.wav');
E60L( :, 33) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\L60e320a.wav');
E60L( :, 34) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\L60e330a.wav');
E60L( :, 35) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\L60e340a.wav');
E60L( :, 36) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\L60e350a.wav');
```

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E70L = zeros(512, 24);
E70L( :, 1) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev70\L70e000a.wav');
E70L( :, 2) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev70\L70e015a.wav');
E70L( :, 3) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev70\L70e030a.wav');
E70L( :, 4) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev70\L70e045a.wav');
E70L( :, 5) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev70\L70e060a.wav');
E70L( :, 6) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev70\L70e075a.wav');
E70L( :, 7) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev70\L70e090a.wav');
E70L( :, 8) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev70\L70e105a.wav');
E70L( :, 9) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev70\L70e120a.wav');
E70L( :, 10) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev70\L70e135a.wav');
E70L( :, 11) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev70\L70e150a.wav');
E70L( :, 12) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev70\L70e165a.wav');
E70L( :, 13) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev70\L70e180a.wav');
E70L( :, 14) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev70\L70e195a.wav');
E70L( :, 15) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev70\L70e210a.wav');
E70L( :, 16) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev70\L70e225a.wav');
E70L( :, 17) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev70\L70e240a.wav');
E70L( :, 18) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev70\L70e255a.wav');
E70L( :, 19) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev70\L70e270a.wav');
E70L( :, 20) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev70\L70e285a.wav');
E70L( :, 21) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev70\L70e300a.wav');
E70L( :, 22) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev70\L70e315a.wav');
E70L( :, 23) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev70\L70e330a.wav');
E70L( :, 24) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev70\L70e345a.wav');


E80L = zeros(512, 12);
E80L( :, 1) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev80\L80e000a.wav');
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E80L( :, 2) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev80\L80e030a.wav');
E80L( :, 3) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev80\L80e060a.wav');
E80L( :, 4) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev80\L80e090a.wav');
E80L( :, 5) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev80\L80e120a.wav');
E80L( :, 6) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev80\L80e150a.wav');
E80L( :, 7) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev80\L80e180a.wav');
E80L( :, 8) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev80\L80e210a.wav');
E80L( :, 9) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev80\L80e240a.wav');
E80L( :, 10) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev80\L80e270a.wav');
E80L( :, 11) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev80\L80e300a.wav');
E80L( :, 12) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev80\L80e330a.wav');

E90L = zeros(512, 1);
E90L( :, 1) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev90\L90e000a.wav');


E90R = zeros(512, 1);
E90R( :, 1) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev90\R90e000a.wav');


E80R = zeros(512, 12);
E80R( :, 1) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev80\R80e000a.wav');
E80R( :, 2) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev80\R80e030a.wav');
E80R( :, 3) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev80\R80e060a.wav');
E80R( :, 4) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev80\R80e090a.wav');
E80R( :, 5) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev80\R80e120a.wav');
E80R( :, 6) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev80\R80e150a.wav');
E80R( :, 7) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev80\R80e180a.wav');
E80R( :, 8) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev80\R80e210a.wav');
E80R( :, 9) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev80\R80e240a.wav');
E80R( :, 10) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev80\R80e270a.wav');
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E80R( :, 11) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev80\R80e300a.wav');
E80R( :, 12) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev80\R80e330a.wav');


E70R = zeros(512, 24);
E70R( :, 1) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev70\R70e000a.wav');
E70R( :, 2) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev70\R70e015a.wav');
E70R( :, 3) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev70\R70e030a.wav');
E70R( :, 4) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev70\R70e045a.wav');
E70R( :, 5) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev70\R70e060a.wav');
E70R( :, 6) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev70\R70e075a.wav');
E70R( :, 7) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev70\R70e090a.wav');
E70R( :, 8) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev70\R70e105a.wav');
E70R( :, 9) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev70\R70e120a.wav');
E70R( :, 10) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev70\R70e135a.wav');
E70R( :, 11) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev70\R70e150a.wav');
E70R( :, 12) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev70\R70e165a.wav');
E70R( :, 13) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev70\R70e180a.wav');
E70R( :, 14) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev70\R70e195a.wav');
E70R( :, 15) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev70\R70e210a.wav');
E70R( :, 16) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev70\R70e225a.wav');
E70R( :, 17) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev70\R70e240a.wav');
E70R( :, 18) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev70\R70e255a.wav');
E70R( :, 19) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev70\R70e270a.wav');
E70R( :, 20) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev70\R70e285a.wav');
E70R( :, 21) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev70\R70e300a.wav');
E70R( :, 22) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev70\R70e315a.wav');
E70R( :, 23) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev70\R70e330a.wav');
```

```
E70R( :, 24) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev70\R70e345a.wav');


E60R = zeros(512, 36);
E60R( :, 1) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\R60e000a.wav');
E60R( :, 2) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\R60e010a.wav');
E60R( :, 3) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\R60e020a.wav');
E60R( :, 4) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\R60e030a.wav');
E60R( :, 5) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\R60e040a.wav');
E60R( :, 6) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\R60e050a.wav');
E60R( :, 7) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\R60e060a.wav');
E60R( :, 8) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\R60e070a.wav');
E60R( :, 9) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\R60e080a.wav');
E60R( :, 10) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\R60e090a.wav');
E60R( :, 11) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\R60e100a.wav');
E60R( :, 12) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\R60e110a.wav');
E60R( :, 13) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\R60e120a.wav');
E60R( :, 14) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\R60e130a.wav');
E60R( :, 15) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\R60e140a.wav');
E60R( :, 16) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\R60e150a.wav');
E60R( :, 17) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\R60e160a.wav');
E60R( :, 18) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\R60e170a.wav');
E60R( :, 19) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\R60e180a.wav');
E60R( :, 20) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\R60e190a.wav');
E60R( :, 21) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\R60e200a.wav');
E60R( :, 22) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\R60e210a.wav');
E60R( :, 23) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\R60e220a.wav');
E60R( :, 24) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\R60e230a.wav');
```

```
E60R( :, 25) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\R60e240a.wav');
E60R( :, 26) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\R60e250a.wav');
E60R( :, 27) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\R60e260a.wav');
E60R( :, 28) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\R60e270a.wav');
E60R( :, 29) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\R60e280a.wav');
E60R( :, 30) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\R60e290a.wav');
E60R( :, 31) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\R60e300a.wav');
E60R( :, 32) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\R60e310a.wav');
E60R( :, 33) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\R60e320a.wav');
E60R( :, 34) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\R60e330a.wav');
E60R( :, 35) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\R60e340a.wav');
E60R( :, 36) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev60\R60e350a.wav');


E50R = zeros(512, 45 );
E50R( :, 1) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\R50e000a.wav');
E50R( :, 2) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\R50e008a.wav');
E50R( :, 3) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\R50e016a.wav');
E50R( :, 4) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\R50e024a.wav');
E50R( :, 5) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\R50e032a.wav');
E50R( :, 6) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\R50e040a.wav');
E50R( :, 7) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\R50e048a.wav');
E50R( :, 8) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\R50e056a.wav');
E50R( :, 9) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\R50e064a.wav');
E50R( :, 10) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\R50e072a.wav');
E50R( :, 11) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\R50e080a.wav');
E50R( :, 12) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\R50e088a.wav');
E50R( :, 13) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\R50e096a.wav');
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```
E50R( :, 14) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\R50e104a.wav');
E50R( :, 15) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\R50e112a.wav');
E50R( :, 16) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\R50e120a.wav');
E50R( :, 17) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\R50e128a.wav');
E50R( :, 18) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\R50e136a.wav');
E50R( :, 19) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\R50e144a.wav');
E50R( :, 20) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\R50e152a.wav');
E50R( :, 21) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\R50e160a.wav');
E50R( :, 22) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\R50e168a.wav');
E50R( :, 23) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\R50e176a.wav');
E50R( :, 24) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\R50e184a.wav');
E50R( :, 25) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\R50e192a.wav');
E50R( :, 26) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\R50e200a.wav');
E50R( :, 27) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\R50e208a.wav');
E50R( :, 28) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\R50e216a.wav');
E50R( :, 29) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\R50e224a.wav');
E50R( :, 30) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\R50e232a.wav');
E50R( :, 31) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\R50e240a.wav');
E50R( :, 32) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\R50e248a.wav');
E50R( :, 33) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\R50e256a.wav');
E50R( :, 34) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\R50e264a.wav');
E50R( :, 35) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\R50e272a.wav');
E50R( :, 36) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\R50e280a.wav');
E50R( :, 37) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\R50e288a.wav');
E50R( :, 38) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\R50e296a.wav');
E50R( :, 39) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\R50e304a.wav');
E50R( :, 40) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\R50e312a.wav');
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E50R( :, 41) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\R50e320a.wav');
E50R( :, 42) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\R50e328a.wav');
E50R( :, 43) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\R50e336a.wav');
E50R( :, 44) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\R50e344a.wav');
E50R( :, 45) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev50\R50e352a.wav');


E40R = zeros(512, 56 );
E40R( :, 1) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\R40e000a.wav');
E40R( :, 2) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\R40e006a.wav');
E40R( :, 3) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\R40e013a.wav');
E40R( :, 4) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\R40e019a.wav');
E40R( :, 5) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\R40e026a.wav');
E40R( :, 6) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\R40e032a.wav');
E40R( :, 7) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\R40e039a.wav');
E40R( :, 8) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\R40e045a.wav');
E40R( :, 9) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\R40e051a.wav');
E40R( :, 10) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\R40e058a.wav');
E40R( :, 11) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\R40e064a.wav');
E40R( :, 12) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\R40e071a.wav');
E40R( :, 13) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\R40e077a.wav');
E40R( :, 14) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\R40e084a.wav');
E40R( :, 15) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\R40e090a.wav');
E40R( :, 16) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\R40e096a.wav');
E40R( :, 17) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\R40e103a.wav');
E40R( :, 18) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\R40e109a.wav');
E40R( :, 19) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\R40e116a.wav');
E40R( :, 20) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\R40e122a.wav');
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E40R( :, 21) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\R40e129a.wav');
E40R( :, 22) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\R40e135a.wav');
E40R( :, 23) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\R40e141a.wav');
E40R( :, 24) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\R40e148a.wav');
E40R( :, 25) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\R40e154a.wav');
E40R( :, 26) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\R40e161a.wav');
E40R( :, 27) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\R40e167a.wav');
E40R( :, 28) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\R40e174a.wav');
E40R( :, 29) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\R40e180a.wav');
E40R( :, 30) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\R40e186a.wav');
E40R( :, 31) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\R40e193a.wav');
E40R( :, 32) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\R40e199a.wav');
E40R( :, 33) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\R40e206a.wav');
E40R( :, 34) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\R40e212a.wav');
E40R( :, 35) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\R40e219a.wav');
E40R( :, 36) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\R40e225a.wav');
E40R( :, 37) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\R40e231a.wav');
E40R( :, 38) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\R40e238a.wav');
E40R( :, 39) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\R40e244a.wav');
E40R( :, 40) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\R40e251a.wav');
E40R( :, 41) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\R40e257a.wav');
E40R( :, 42) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\R40e264a.wav');
E40R( :, 43) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\R40e270a.wav');
E40R( :, 44) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\R40e276a.wav');
E40R( :, 45) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\R40e283a.wav');
E40R( :, 46) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\R40e289a.wav');
E40R( :, 47) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\R40e296a.wav');
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E40R( :, 48) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\R40e302a.wav');
E40R( :, 49) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\R40e309a.wav');
E40R( :, 50) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\R40e315a.wav');
E40R( :, 51) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\R40e321a.wav');
E40R( :, 52) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\R40e328a.wav');
E40R( :, 53) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\R40e334a.wav');
E40R( :, 54) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\R40e341a.wav');
E40R( :, 55) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\R40e347a.wav');
E40R( :, 56) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev40\R40e354a.wav');


E30R = zeros(512, 60 );
E30R( :, 1) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\R30e000a.wav');
E30R( :, 2) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\R30e006a.wav');
E30R( :, 3) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\R30e012a.wav');
E30R( :, 4) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\R30e018a.wav');
E30R( :, 5) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\R30e024a.wav');
E30R( :, 6) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\R30e030a.wav');
E30R( :, 7) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\R30e036a.wav');
E30R( :, 8) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\R30e042a.wav');
E30R( :, 9) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\R30e048a.wav');
E30R( :, 10) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\R30e054a.wav');
E30R( :, 11) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\R30e060a.wav');
E30R( :, 12) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\R30e066a.wav');
E30R( :, 13) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\R30e072a.wav');
E30R( :, 14) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\R30e078a.wav');
E30R( :, 15) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\R30e084a.wav');
E30R( :, 16) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\R30e090a.wav');
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E30R( :, 17) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\R30e096a.wav');
E30R( :, 18) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\R30e102a.wav');
E30R( :, 19) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\R30e108a.wav');
E30R( :, 20) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\R30e114a.wav');
E30R( :, 21) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\R30e120a.wav');
E30R( :, 22) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\R30e126a.wav');
E30R( :, 23) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\R30e132a.wav');
E30R( :, 24) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\R30e138a.wav');
E30R( :, 25) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\R30e144a.wav');
E30R( :, 26) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\R30e150a.wav');
E30R( :, 27) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\R30e156a.wav');
E30R( :, 28) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\R30e162a.wav');
E30R( :, 29) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\R30e168a.wav');
E30R( :, 30) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\R30e174a.wav');
E30R( :, 31) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\R30e180a.wav');
E30R( :, 32) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\R30e186a.wav');
E30R( :, 33) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\R30e192a.wav');
E30R( :, 34) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\R30e198a.wav');
E30R( :, 35) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\R30e204a.wav');
E30R( :, 36) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\R30e210a.wav');
E30R( :, 37) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\R30e216a.wav');
E30R( :, 38) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\R30e222a.wav');
E30R( :, 39) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\R30e228a.wav');
E30R( :, 40) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\R30e234a.wav');
E30R( :, 41) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\R30e240a.wav');
E30R( :, 42) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\R30e246a.wav');
E30R( :, 43) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\R30e252a.wav');
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E30R( :, 44) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\R30e258a.wav');
E30R( :, 45) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\R30e264a.wav');
E30R( :, 46) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\R30e270a.wav');
E30R( :, 47) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\R30e276a.wav');
E30R( :, 48) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\R30e282a.wav');
E30R( :, 49) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\R30e288a.wav');
E30R( :, 50) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\R30e294a.wav');
E30R( :, 51) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\R30e300a.wav');
E30R( :, 52) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\R30e306a.wav');
E30R( :, 53) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\R30e312a.wav');
E30R( :, 54) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\R30e318a.wav');
E30R( :, 55) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\R30e324a.wav');
E30R( :, 56) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\R30e330a.wav');
E30R( :, 57) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\R30e336a.wav');
E30R( :, 58) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\R30e342a.wav');
E30R( :, 59) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\R30e348a.wav');
E30R( :, 60) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev30\R30e354a.wav');


E20R = zeros(512, 72 );
E20R( :, 1) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e000a.wav');
E20R( :, 2) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e005a.wav');
E20R( :, 3) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e010a.wav');
E20R( :, 4) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e015a.wav');
E20R( :, 5) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e020a.wav');
E20R( :, 6) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e025a.wav');
E20R( :, 7) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e030a.wav');
E20R( :, 8) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e035a.wav');
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E20R( :, 9) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e040a.wav');
E20R( :, 10) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e045a.wav');
E20R( :, 11) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e050a.wav');
E20R( :, 12) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e055a.wav');
E20R( :, 13) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e060a.wav');
E20R( :, 14) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e065a.wav');
E20R( :, 15) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e070a.wav');
E20R( :, 16) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e075a.wav');
E20R( :, 17) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e080a.wav');
E20R( :, 18) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e085a.wav');
E20R( :, 19) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e090a.wav');
E20R( :, 20) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e095a.wav');
E20R( :, 21) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e100a.wav');
E20R( :, 22) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e105a.wav');
E20R( :, 23) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e110a.wav');
E20R( :, 24) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e115a.wav');
E20R( :, 25) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e120a.wav');
E20R( :, 26) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e125a.wav');
E20R( :, 27) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e130a.wav');
E20R( :, 28) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e135a.wav');
E20R( :, 29) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e140a.wav');
E20R( :, 30) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e145a.wav');
E20R( :, 31) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e150a.wav');
E20R( :, 32) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e155a.wav');
E20R( :, 33) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e160a.wav');
E20R( :, 34) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e165a.wav');
E20R( :, 35) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e170a.wav');
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E20R( :, 36) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e175a.wav');
E20R( :, 37) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e180a.wav');
E20R( :, 38) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e185a.wav');
E20R( :, 39) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e190a.wav');
E20R( :, 40) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e195a.wav');
E20R( :, 41) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e200a.wav');
E20R( :, 42) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e205a.wav');
E20R( :, 43) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e210a.wav');
E20R( :, 44) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e215a.wav');
E20R( :, 45) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e220a.wav');
E20R( :, 46) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e225a.wav');
E20R( :, 47) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e230a.wav');
E20R( :, 48) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e235a.wav');
E20R( :, 49) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e240a.wav');
E20R( :, 50) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e245a.wav');
E20R( :, 51) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e250a.wav');
E20R( :, 52) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e255a.wav');
E20R( :, 53) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e260a.wav');
E20R( :, 54) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e265a.wav');
E20R( :, 55) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e270a.wav');
E20R( :, 56) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e275a.wav');
E20R( :, 57) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e280a.wav');
E20R( :, 58) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e285a.wav');
E20R( :, 59) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e290a.wav');
E20R( :, 60) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e295a.wav');
E20R( :, 61) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e300a.wav');
E20R( :, 62) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e305a.wav');
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E20R( :, 63) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e310a.wav');
E20R( :, 64) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e315a.wav');
E20R( :, 65) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e320a.wav');
E20R( :, 66) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e325a.wav');
E20R( :, 67) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e330a.wav');
E20R( :, 68) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e335a.wav');
E20R( :, 69) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e340a.wav');
E20R( :, 70) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e345a.wav');
E20R( :, 71) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e350a.wav');
E20R( :, 72) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev20\R20e355a.wav');


E10R = zeros(512, 72 );
E10R( :, 1) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e000a.wav');
E10R( :, 2) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e005a.wav');
E10R( :, 3) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e010a.wav');
E10R( :, 4) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e015a.wav');
E10R( :, 5) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e020a.wav');
E10R( :, 6) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e025a.wav');
E10R( :, 7) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e030a.wav');
E10R( :, 8) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e035a.wav');
E10R( :, 9) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e040a.wav');
E10R( :, 10) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e045a.wav');
E10R( :, 11) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e050a.wav');
E10R( :, 12) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e055a.wav');
E10R( :, 13) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e060a.wav');
E10R( :, 14) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e065a.wav');
E10R( :, 15) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e070a.wav');
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E10R( :, 16) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e075a.wav');
E10R( :, 17) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e080a.wav');
E10R( :, 18) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e085a.wav');
E10R( :, 19) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e090a.wav');
E10R( :, 20) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e095a.wav');
E10R( :, 21) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e100a.wav');
E10R( :, 22) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e105a.wav');
E10R( :, 23) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e110a.wav');
E10R( :, 24) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e115a.wav');
E10R( :, 25) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e120a.wav');
E10R( :, 26) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e125a.wav');
E10R( :, 27) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e130a.wav');
E10R( :, 28) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e135a.wav');
E10R( :, 29) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e140a.wav');
E10R( :, 30) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e145a.wav');
E10R( :, 31) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e150a.wav');
E10R( :, 32) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e155a.wav');
E10R( :, 33) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e160a.wav');
E10R( :, 34) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e165a.wav');
E10R( :, 35) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e170a.wav');
E10R( :, 36) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e175a.wav');
E10R( :, 37) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e180a.wav');
E10R( :, 38) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e185a.wav');
E10R( :, 39) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e190a.wav');
E10R( :, 40) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e195a.wav');
E10R( :, 41) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e200a.wav');
E10R( :, 42) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e205a.wav');
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E10R( :, 43) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e210a.wav');
E10R( :, 44) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e215a.wav');
E10R( :, 45) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e220a.wav');
E10R( :, 46) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e225a.wav');
E10R( :, 47) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e230a.wav');
E10R( :, 48) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e235a.wav');
E10R( :, 49) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e240a.wav');
E10R( :, 50) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e245a.wav');
E10R( :, 51) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e250a.wav');
E10R( :, 52) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e255a.wav');
E10R( :, 53) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e260a.wav');
E10R( :, 54) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e265a.wav');
E10R( :, 55) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e270a.wav');
E10R( :, 56) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e275a.wav');
E10R( :, 57) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e280a.wav');
E10R( :, 58) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e285a.wav');
E10R( :, 59) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e290a.wav');
E10R( :, 60) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e295a.wav');
E10R( :, 61) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e300a.wav');
E10R( :, 62) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e305a.wav');
E10R( :, 63) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e310a.wav');
E10R( :, 64) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e315a.wav');
E10R( :, 65) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e320a.wav');
E10R( :, 66) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e325a.wav');
E10R( :, 67) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e330a.wav');
E10R( :, 68) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e335a.wav');
E10R( :, 69) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e340a.wav');
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E10R( :, 70) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e345a.wav');
E10R( :, 71) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e350a.wav');
E10R( :, 72) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev10\R10e355a.wav');


E_00R = zeros(512, 72 );
E_00R( :, 1) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e000a.wav');
E_00R( :, 2) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e005a.wav');
E_00R( :, 3) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e010a.wav');
E_00R( :, 4) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e015a.wav');
E_00R( :, 5) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e020a.wav');
E_00R( :, 6) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e025a.wav');
E_00R( :, 7) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e030a.wav');
E_00R( :, 8) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e035a.wav');
E_00R( :, 9) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e040a.wav');
E_00R( :, 10) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e045a.wav');
E_00R( :, 11) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e050a.wav');
E_00R( :, 12) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e055a.wav');
E_00R( :, 13) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e060a.wav');
E_00R( :, 14) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e065a.wav');
E_00R( :, 15) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e070a.wav');
E_00R( :, 16) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e075a.wav');
E_00R( :, 17) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e080a.wav');
E_00R( :, 18) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e085a.wav');
E_00R( :, 19) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e090a.wav');
E_00R( :, 20) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e095a.wav');
E_00R( :, 21) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e100a.wav');
E_00R( :, 22) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e105a.wav');
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E_00R( :, 23) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e110a.wav');
E_00R( :, 24) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e115a.wav');
E_00R( :, 25) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e120a.wav');
E_00R( :, 26) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e125a.wav');
E_00R( :, 27) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e130a.wav');
E_00R( :, 28) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e135a.wav');
E_00R( :, 29) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e140a.wav');
E_00R( :, 30) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e145a.wav');
E_00R( :, 31) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e150a.wav');
E_00R( :, 32) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e155a.wav');
E_00R( :, 33) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e160a.wav');
E_00R( :, 34) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e165a.wav');
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E_00R( :, 36) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e175a.wav');
E_00R( :, 37) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e180a.wav');
E_00R( :, 38) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e185a.wav');
E_00R( :, 39) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e190a.wav');
E_00R( :, 40) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e195a.wav');
E_00R( :, 41) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e200a.wav');
E_00R( :, 42) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e205a.wav');
E_00R( :, 43) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e210a.wav');
E_00R( :, 44) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e215a.wav');
E_00R( :, 45) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e220a.wav');
E_00R( :, 46) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e225a.wav');
E_00R( :, 47) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e230a.wav');
E_00R( :, 48) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e235a.wav');
E_00R( :, 49) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e240a.wav');
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E_00R( :, 50) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e245a.wav');
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E_00R( :, 52) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e255a.wav');
E_00R( :, 53) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e260a.wav');
E_00R( :, 54) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e265a.wav');
E_00R( :, 55) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e270a.wav');
E_00R( :, 56) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e275a.wav');
E_00R( :, 57) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e280a.wav');
E_00R( :, 58) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e285a.wav');
E_00R( :, 59) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e290a.wav');
E_00R( :, 60) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e295a.wav');
E_00R( :, 61) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e300a.wav');
E_00R( :, 62) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e305a.wav');
E_00R( :, 63) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e310a.wav');
E_00R( :, 64) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e315a.wav');
E_00R( :, 65) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e320a.wav');
E_00R( :, 66) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e325a.wav');
E_00R( :, 67) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e330a.wav');
E_00R( :, 68) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e335a.wav');
E_00R( :, 69) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e340a.wav');
E_00R( :, 70) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e345a.wav');
E_00R( :, 71) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e350a.wav');
E_00R( :, 72) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev0\R0e355a.wav');


E_10R = zeros(512, 72 );
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E_10R( :, 4) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\R-10e015a.wav');
E_10R( :, 5) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\R-10e020a.wav');
E_10R( :, 6) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\R-10e025a.wav');
E_10R( :, 7) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\R-10e030a.wav');
E_10R( :, 8) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\R-10e035a.wav');
E_10R( :, 9) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\R-10e040a.wav');
E_10R( :, 10) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\R-10e045a.wav');
E_10R( :, 11) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\R-10e050a.wav');
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E_10R( :, 14) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\R-10e065a.wav');
E_10R( :, 15) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\R-10e070a.wav');
E_10R( :, 16) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\R-10e075a.wav');
E_10R( :, 17) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\R-10e080a.wav');
E_10R( :, 18) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\R-10e085a.wav');
E_10R( :, 19) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\R-10e090a.wav');
E_10R( :, 20) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\R-10e095a.wav');
E_10R( :, 21) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\R-10e100a.wav');
E_10R( :, 22) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\R-10e105a.wav');
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E_10R( :, 24) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\R-10e115a.wav');
E_10R( :, 25) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\R-10e120a.wav');
E_10R( :, 26) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\R-10e125a.wav');
E_10R( :, 27) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\R-10e130a.wav');
E_10R( :, 28) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\R-10e135a.wav');
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E_10R( :, 33) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\R-10e160a.wav');
E_10R( :, 34) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\R-10e165a.wav');
E_10R( :, 35) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\R-10e170a.wav');
E_10R( :, 36) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\R-10e175a.wav');
E_10R( :, 37) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\R-10e180a.wav');
E_10R( :, 38) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\R-10e185a.wav');
E_10R( :, 39) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\R-10e190a.wav');
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E_10R( :, 42) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\R-10e205a.wav');
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E_10R( :, 47) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\R-10e230a.wav');
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E_10R( :, 49) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\R-10e240a.wav');
E_10R( :, 50) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\R-10e245a.wav');
E_10R( :, 51) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\R-10e250a.wav');
E_10R( :, 52) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\R-10e255a.wav');
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E_10R( :, 54) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\R-10e265a.wav');
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E_10R( :, 56) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\R-10e275a.wav');
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E_10R( :, 57) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\R-10e280a.wav');
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E_10R( :, 59) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\R-10e290a.wav');
E_10R( :, 60) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\R-10e295a.wav');
E_10R( :, 61) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\R-10e300a.wav');
E_10R( :, 62) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\R-10e305a.wav');
E_10R( :, 63) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\R-10e310a.wav');
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E_10R( :, 65) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\R-10e320a.wav');
E_10R( :, 66) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\R-10e325a.wav');
E_10R( :, 67) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\R-10e330a.wav');
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E_10R( :, 69) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\R-10e340a.wav');
E_10R( :, 70) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\R-10e345a.wav');
E_10R( :, 71) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\R-10e350a.wav');
E_10R( :, 72) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-10\R-10e355a.wav');


E_20R = zeros(512, 72 );
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E_20R( :, 2) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e005a.wav');
E_20R( :, 3) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e010a.wav');
E_20R( :, 4) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e015a.wav');
E_20R( :, 5) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e020a.wav');
E_20R( :, 6) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e025a.wav');
E_20R( :, 7) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e030a.wav');
E_20R( :, 8) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e035a.wav');
E_20R( :, 9) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e040a.wav');
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E_20R( :, 11) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e050a.wav');
E_20R( :, 12) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e055a.wav');
E_20R( :, 13) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e060a.wav');
E_20R( :, 14) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e065a.wav');
E_20R( :, 15) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e070a.wav');
E_20R( :, 16) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e075a.wav');
E_20R( :, 17) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e080a.wav');
E_20R( :, 18) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e085a.wav');
E_20R( :, 19) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e090a.wav');
E_20R( :, 20) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e095a.wav');
E_20R( :, 21) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e100a.wav');
E_20R( :, 22) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e105a.wav');
E_20R( :, 23) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e110a.wav');
E_20R( :, 24) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e115a.wav');
E_20R( :, 25) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e120a.wav');
E_20R( :, 26) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e125a.wav');
E_20R( :, 27) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e130a.wav');
E_20R( :, 28) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e135a.wav');
E_20R( :, 29) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e140a.wav');
E_20R( :, 30) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e145a.wav');
E_20R( :, 31) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e150a.wav');
E_20R( :, 32) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e155a.wav');
E_20R( :, 33) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e160a.wav');
E_20R( :, 34) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e165a.wav');
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E_20R( :, 36) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e175a.wav');
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E_20R( :, 37) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e180a.wav');
E_20R( :, 38) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e185a.wav');
E_20R( :, 39) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e190a.wav');
E_20R( :, 40) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e195a.wav');
E_20R( :, 41) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e200a.wav');
E_20R( :, 42) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e205a.wav');
E_20R( :, 43) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e210a.wav');
E_20R( :, 44) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e215a.wav');
E_20R( :, 45) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e220a.wav');
E_20R( :, 46) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e225a.wav');
E_20R( :, 47) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e230a.wav');
E_20R( :, 48) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e235a.wav');
E_20R( :, 49) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e240a.wav');
E_20R( :, 50) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e245a.wav');
E_20R( :, 51) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e250a.wav');
E_20R( :, 52) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e255a.wav');
E_20R( :, 53) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e260a.wav');
E_20R( :, 54) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e265a.wav');
E_20R( :, 55) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e270a.wav');
E_20R( :, 56) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e275a.wav');
E_20R( :, 57) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e280a.wav');
E_20R( :, 58) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e285a.wav');
E_20R( :, 59) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e290a.wav');
E_20R( :, 60) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e295a.wav');
E_20R( :, 61) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e300a.wav');
E_20R( :, 62) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e305a.wav');
E_20R( :, 63) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e310a.wav');
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E_20R( :, 64) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e315a.wav');
E_20R( :, 65) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e320a.wav');
E_20R( :, 66) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e325a.wav');
E_20R( :, 67) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e330a.wav');
E_20R( :, 68) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e335a.wav');
E_20R( :, 69) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e340a.wav');
E_20R( :, 70) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e345a.wav');
E_20R( :, 71) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e350a.wav');
E_20R( :, 72) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-20\R-20e355a.wav');


E_30R = zeros(512, 60 );
E_30R( :, 1) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\R-30e000a.wav');
E_30R( :, 2) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\R-30e006a.wav');
E_30R( :, 3) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\R-30e012a.wav');
E_30R( :, 4) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\R-30e018a.wav');
E_30R( :, 5) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\R-30e024a.wav');
E_30R( :, 6) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\R-30e030a.wav');
E_30R( :, 7) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\R-30e036a.wav');
E_30R( :, 8) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\R-30e042a.wav');
E_30R( :, 9) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\R-30e048a.wav');
E_30R( :, 10) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\R-30e054a.wav');
E_30R( :, 11) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\R-30e060a.wav');
E_30R( :, 12) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\R-30e066a.wav');
E_30R( :, 13) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\R-30e072a.wav');
E_30R( :, 14) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\R-30e078a.wav');
E_30R( :, 15) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\R-30e084a.wav');
E_30R( :, 16) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\R-30e090a.wav');
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E_30R( :, 17) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\R-30e096a.wav');
E_30R( :, 18) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\R-30e102a.wav');
E_30R( :, 19) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\R-30e108a.wav');
E_30R( :, 20) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\R-30e114a.wav');
E_30R( :, 21) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\R-30e120a.wav');
E_30R( :, 22) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\R-30e126a.wav');
E_30R( :, 23) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\R-30e132a.wav');
E_30R( :, 24) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\R-30e138a.wav');
E_30R( :, 25) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\R-30e144a.wav');
E_30R( :, 26) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\R-30e150a.wav');
E_30R( :, 27) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\R-30e156a.wav');
E_30R( :, 28) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\R-30e162a.wav');
E_30R( :, 29) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\R-30e168a.wav');
E_30R( :, 30) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\R-30e174a.wav');
E_30R( :, 31) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\R-30e180a.wav');
E_30R( :, 32) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\R-30e186a.wav');
E_30R( :, 33) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\R-30e192a.wav');
E_30R( :, 34) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\R-30e198a.wav');
E_30R( :, 35) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\R-30e204a.wav');
E_30R( :, 36) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\R-30e210a.wav');
E_30R( :, 37) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\R-30e216a.wav');
E_30R( :, 38) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\R-30e222a.wav');
E_30R( :, 39) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\R-30e228a.wav');
E_30R( :, 40) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\R-30e234a.wav');
E_30R( :, 41) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\R-30e240a.wav');
E_30R( :, 42) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\R-30e246a.wav');
E_30R( :, 43) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\R-30e252a.wav');
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E_30R( :, 44) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\R-30e258a.wav');
E_30R( :, 45) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\R-30e264a.wav');
E_30R( :, 46) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\R-30e270a.wav');
E_30R( :, 47) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\R-30e276a.wav');
E_30R( :, 48) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\R-30e282a.wav');
E_30R( :, 49) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\R-30e288a.wav');
E_30R( :, 50) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\R-30e294a.wav');
E_30R( :, 51) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\R-30e300a.wav');
E_30R( :, 52) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\R-30e306a.wav');
E_30R( :, 53) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\R-30e312a.wav');
E_30R( :, 54) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\R-30e318a.wav');
E_30R( :, 55) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\R-30e324a.wav');
E_30R( :, 56) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\R-30e330a.wav');
E_30R( :, 57) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\R-30e336a.wav');
E_30R( :, 58) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\R-30e342a.wav');
E_30R( :, 59) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\R-30e348a.wav');
E_30R( :, 60) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-30\R-30e354a.wav');


E_40R = zeros(512, 56 );
E_40R( :, 1) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\R-40e000a.wav');
E_40R( :, 2) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\R-40e006a.wav');
E_40R( :, 3) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\R-40e013a.wav');
E_40R( :, 4) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\R-40e019a.wav');
E_40R( :, 5) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\R-40e026a.wav');
E_40R( :, 6) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\R-40e032a.wav');
E_40R( :, 7) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\R-40e039a.wav');
E_40R( :, 8) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\R-40e045a.wav');
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E_40R( :, 9) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\R-40e051a.wav');
E_40R( :, 10) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\R-40e058a.wav');
E_40R( :, 11) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\R-40e064a.wav');
E_40R( :, 12) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\R-40e071a.wav');
E_40R( :, 13) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\R-40e077a.wav');
E_40R( :, 14) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\R-40e084a.wav');
E_40R( :, 15) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\R-40e090a.wav');
E_40R( :, 16) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\R-40e096a.wav');
E_40R( :, 17) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\R-40e103a.wav');
E_40R( :, 18) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\R-40e109a.wav');
E_40R( :, 19) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\R-40e116a.wav');
E_40R( :, 20) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\R-40e122a.wav');
E_40R( :, 21) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\R-40e129a.wav');
E_40R( :, 22) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\R-40e135a.wav');
E_40R( :, 23) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\R-40e141a.wav');
E_40R( :, 24) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\R-40e148a.wav');
E_40R( :, 25) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\R-40e154a.wav');
E_40R( :, 26) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\R-40e161a.wav');
E_40R( :, 27) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\R-40e167a.wav');
E_40R( :, 28) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\R-40e174a.wav');
E_40R( :, 29) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\R-40e180a.wav');
E_40R( :, 30) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\R-40e186a.wav');
E_40R( :, 31) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\R-40e193a.wav');
E_40R( :, 32) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\R-40e199a.wav');
E_40R( :, 33) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\R-40e206a.wav');
E_40R( :, 34) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\R-40e212a.wav');
E_40R( :, 35) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\R-40e219a.wav');
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E_40R( :, 36) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\R-40e225a.wav');
E_40R( :, 37) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\R-40e231a.wav');
E_40R( :, 38) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\R-40e238a.wav');
E_40R( :, 39) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\R-40e244a.wav');
E_40R( :, 40) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\R-40e251a.wav');
E_40R( :, 41) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\R-40e257a.wav');
E_40R( :, 42) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\R-40e264a.wav');
E_40R( :, 43) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\R-40e270a.wav');
E_40R( :, 44) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\R-40e276a.wav');
E_40R( :, 45) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\R-40e283a.wav');
E_40R( :, 46) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\R-40e289a.wav');
E_40R( :, 47) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\R-40e296a.wav');
E_40R( :, 48) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\R-40e302a.wav');
E_40R( :, 49) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\R-40e309a.wav');
E_40R( :, 50) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\R-40e315a.wav');
E_40R( :, 51) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\R-40e321a.wav');
E_40R( :, 52) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\R-40e328a.wav');
E_40R( :, 53) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\R-40e334a.wav');
E_40R( :, 54) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\R-40e341a.wav');
E_40R( :, 55) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\R-40e347a.wav');
E_40R( :, 56) = wavread('C:\Documents and Settings\David Yang\Desktop\paper\HRTF data\original data\Full360\elev-40\R-40e354a.wav');
```

A.2 sameelevation.m

```
% to display the HRIR in time domain.
% HRIRs with the same elevation

[X, Y] = meshgrid(0 : 255, 0 : 71);

Z = E_40L';
figure(1)
mesh(Z(:, 1 : 256))
title('Left ear HRIRs at elevation of -40 degree')

Z = E_40R';
figure(2)
mesh(Z(:, 1 : 256))
title('Right ear HRIRs at elevation of -40 degree')

Z = E_30L';
figure(3)
mesh(Z(:, 1 : 256))
title('Left ear HRIRs at elevation of -30 degree')

Z = E_30R';
figure(4)
mesh(Z(:, 1 : 256))
title('Right ear HRIRs at elevation of -30 degree')

Z = E_20L';
figure(5)
mesh(Z(:, 1 : 256))
title('Left ear HRIRs at elevation of -20 degree')

Z = E_20R';
figure(6)
mesh(Z(:, 1 : 256))
title('Right ear HRIRs at elevation of -20 degree')

Z = E_10L';
figure(7)
mesh(Z(:, 1 : 256))
title('Left ear HRIRs at elevation of -10 degree')

Z = E_10R';
figure(8)
mesh(Z(:, 1 : 256))
title('Right ear HRIRs at elevation of -10 degree')

Z = E_00L';
figure(9)
mesh(Z(:, 1 : 256))
title('Left ear HRIRs at elevation of 0 degree')

Z = E_00R';
```

```
figure(10)
mesh(Z(:, 1 : 256))
title('Right ear HRIRs at elevation of 0 degree')

Z = E10L';
figure(11)
mesh(Z(:, 1 : 256))
title('Left ear HRIRs at elevation of 10 degree')

Z = E10R';
figure(12)
mesh(Z(:, 1 : 256))
title('Right ear HRIRs at elevation of 10 degree')

Z = E20L';
figure(13)
mesh(Z(:, 1 : 256))
title('Left ear HRIRs at elevation of 20 degree')

Z = E20R';
figure(14)
mesh(Z(:, 1 : 256))
title('Right ear HRIRs at elevation of 20 degree')

Z = E30L';
figure(15)
mesh(Z(:, 1 : 256))
title('Left ear HRIRs at elevation of 30 degree')

Z = E30R';
figure(16)
mesh(Z(:, 1 : 256))
title('Right ear HRIRs at elevation of 30 degree')

Z = E40L';
figure(17)
mesh(Z(:, 1 : 256))
title('Left ear HRIRs at elevation of 40 degree')

Z = E40R';
figure(18)
mesh(Z(:, 1 : 256))
title('Right ear HRIRs at elevation of 40 degree')

Z = E50L';
figure(19)
mesh(Z(:, 1 : 256))
title('Left ear HRIRs at elevation of 50 degree')

Z = E50R';
figure(20)
mesh(Z(:, 1 : 256))
title('Right ear HRIRs at elevation of 50 degree')
```

```
Z = E60L';
figure(21)
mesh(Z(:, 1 : 256))
title('Left ear HRIRs at elevation of 60 degree')

Z = E60R';
figure(22)
mesh(Z(:, 1 : 256))
title('Right ear HRIRs at elevation of 60 degree')

Z = E70L';
figure(23)
mesh(Z(:, 1 : 256))
title('Left ear HRIRs at elevation of 70 degree')

Z = E70R';
figure(24)
mesh(Z(:, 1 : 256))
title('Right ear HRIRs at elevation of 70 degree')

Z = E80L';
figure(25)
mesh(Z(:, 1 : 256))
title('Left ear HRIRs at elevation of 80 degree')

Z = E80R';
figure(26)
mesh(Z(:, 1 : 256))
title('Right ear HRIRs at elevation of 80 degree')
```

A.3 sameazimuth.m

```
% to display the HRIR in time domain.
% HRIRs with the same azimuth

% 0 degree azimuth
azimuth_0_L( :, 1) = E_40L( :, 1);
azimuth_0_L( :, 2) = E_30L( :, 1);
azimuth_0_L( :, 3) = E_20L( :, 1)
azimuth_0_L( :, 4) = E_10L( :, 1)
azimuth_0_L( :, 5) = E_00L( :, 1)
azimuth_0_L( :, 6) = E10L( :, 1)
azimuth_0_L( :, 7) = E20L( :, 1)
azimuth_0_L( :, 8) = E30L( :, 1)
azimuth_0_L( :, 9) = E40L( :, 1)
azimuth_0_L( :, 10) = E50L( :, 1)
azimuth_0_L( :, 11) = E60L( :, 1)
azimuth_0_L( :, 12) = E70L( :, 1)
azimuth_0_L( :, 13) = E80L( :, 1)
azimuth_0_L( :, 14) = E90L( :, 1)


[X, Y] = meshgrid(0 : 255, 0 : 14);
Z = azimuth_0_L';
figure(1)
mesh(Z(:, 1 : 256))
title('Left ear HRIRs at azimuth of 0 degree')


azimuth_0_R( :, 1) = E_40R( :, 1);
azimuth_0_R( :, 2) = E_30R( :, 1);
azimuth_0_R( :, 3) = E_20R( :, 1)
azimuth_0_R( :, 4) = E_10R( :, 1)
azimuth_0_R( :, 5) = E_00R( :, 1)
azimuth_0_R( :, 6) = E10R( :, 1)
azimuth_0_R( :, 7) = E20R( :, 1)
azimuth_0_R( :, 8) = E30R( :, 1)
azimuth_0_R( :, 9) = E40R( :, 1)
azimuth_0_R( :, 10) = E50R( :, 1)
azimuth_0_R( :, 11) = E60R( :, 1)
azimuth_0_R( :, 12) = E70R( :, 1)
azimuth_0_R( :, 13) = E80R( :, 1)
azimuth_0_R( :, 14) = E90R( :, 1)

Z = azimuth_0_R';
figure(2)
mesh(Z(:, 1 : 256))
title('Right ear HRIRs at azimuth of 0 degree')

% 90 degree azimuth
azimuth_90_L( :, 1) = E_40L( :, 15);
azimuth_90_L( :, 2) = E_30L( :, 16);
azimuth_90_L( :, 3) = E_20L( :, 19)
```

```
azimuth_90_L( :, 4) = E_10L( :, 19)
azimuth_90_L( :, 5) = E_00L( :, 19)
azimuth_90_L( :, 6) = E10L( :, 19)
azimuth_90_L( :, 7) = E20L( :, 19)
azimuth_90_L( :, 8) = E30L( :, 16)
azimuth_90_L( :, 9) = E40L( :, 15)
azimuth_90_L( :, 10) = E50L( :, 12)
azimuth_90_L( :, 11) = E60L( :, 10)
azimuth_90_L( :, 12) = E70L( :, 7)
azimuth_90_L( :, 13) = E80L( :, 4)


Z = azimuth_90_L';
figure(3)
mesh(Z(:, 1 : 256))
title('Left ear HRIRs at azimuth of 90 degree')


azimuth_90_R( :, 1) = E_40R( :, 15);
azimuth_90_R( :, 2) = E_30R( :, 16);
azimuth_90_R( :, 3) = E_20R( :, 19)
azimuth_90_R( :, 4) = E_10R( :, 19)
azimuth_90_R( :, 5) = E_00R( :, 19)
azimuth_90_R( :, 6) = E10R( :, 19)
azimuth_90_R( :, 7) = E20R( :, 19)
azimuth_90_R( :, 8) = E30R( :, 16)
azimuth_90_R( :, 9) = E40R( :, 15)
azimuth_90_R( :, 10) = E50R( :, 12)
azimuth_90_R( :, 11) = E60R( :, 10)
azimuth_90_R( :, 12) = E70R( :, 7)
azimuth_90_R( :, 13) = E80R( :, 4)


Z = azimuth_90_R';
figure(4)
mesh(Z(:, 1 : 256))
title('Right ear HRIRs at azimuth of 90 degree')

% 180 degree azimuth
azimuth_180_L( :, 1) = E_40L( :, 29);
azimuth_180_L( :, 2) = E_30L( :, 31);
azimuth_180_L( :, 3) = E_20L( :, 37)
azimuth_180_L( :, 4) = E_10L( :, 37)
azimuth_180_L( :, 5) = E_00L( :, 37)
azimuth_180_L( :, 6) = E10L( :, 37)
azimuth_180_L( :, 7) = E20L( :, 37)
azimuth_180_L( :, 8) = E30L( :, 31)
azimuth_180_L( :, 9) = E40L( :, 29)
azimuth_180_L( :, 10) = E50L( :, 23)
azimuth_180_L( :, 11) = E60L( :, 19)
azimuth_180_L( :, 12) = E70L( :, 13)
azimuth_180_L( :, 13) = E80L( :, 7)
```

```
Z = azimuth_180_L';
figure(5)
mesh(Z(:, 1 : 256))
title('Left ear HRIRs at azimuth of 180 degree')


azimuth_180_R( :, 1) = E_40R( :, 29);
azimuth_180_R( :, 2) = E_30R( :, 31);
azimuth_180_R( :, 3) = E_20R( :, 37)
azimuth_180_R( :, 4) = E_10R( :, 37)
azimuth_180_R( :, 5) = E_00R( :, 37)
azimuth_180_R( :, 6) = E10R( :, 37)
azimuth_180_R( :, 7) = E20R( :, 37)
azimuth_180_R( :, 8) = E30R( :, 31)
azimuth_180_R( :, 9) = E40R( :, 29)
azimuth_180_R( :, 10) = E50R( :, 23)
azimuth_180_R( :, 11) = E60R( :, 19)
azimuth_180_R( :, 12) = E70R( :, 13)
azimuth_180_R( :, 13) = E80R( :, 7)


Z = azimuth_180_R';
figure(6)
mesh(Z(:, 1 : 256))
title('Right ear HRIRs at azimuth of 180 degree')

% 270 degree azimuth
azimuth_270_L( :, 1) = E_40L( :, 43);
azimuth_270_L( :, 2) = E_30L( :, 46);
azimuth_270_L( :, 3) = E_20L( :, 55)
azimuth_270_L( :, 4) = E_10L( :, 55)
azimuth_270_L( :, 5) = E_00L( :, 55)
azimuth_270_L( :, 6) = E10L( :, 55)
azimuth_270_L( :, 7) = E20L( :, 55)
azimuth_270_L( :, 8) = E30L( :, 46)
azimuth_270_L( :, 9) = E40L( :, 43)
azimuth_270_L( :, 10) = E50L( :, 35)
azimuth_270_L( :, 11) = E60L( :, 28)
azimuth_270_L( :, 12) = E70L( :, 19)
azimuth_270_L( :, 13) = E80L( :, 10)


Z = azimuth_270_L';
figure(7)
mesh(Z(:, 1 : 256))
title('Left ear HRIRs at azimuth of 270 degree')

azimuth_270_R( :, 1) = E_40R( :, 43);
azimuth_270_R( :, 2) = E_30R( :, 46);
azimuth_270_R( :, 3) = E_20R( :, 55)
azimuth_270_R( :, 4) = E_10R( :, 55)
azimuth_270_R( :, 5) = E_00R( :, 55)
azimuth_270_R( :, 6) = E10R( :, 55)
azimuth_270_R( :, 7) = E20R( :, 55)
```

```
azimuth_270_R( :, 8) = E30R( :, 46)
azimuth_270_R( :, 9) = E40R( :, 43)
azimuth_270_R( :, 10) = E50R( :, 35)
azimuth_270_R( :, 11) = E60R( :, 28)
azimuth_270_R( :, 12) = E70R( :, 19)
azimuth_270_R( :, 13) = E80R( :, 10)


Z = azimuth_270_R';
figure(8)
mesh(Z(:, 1 : 256))
title('Right ear HRIRs at azimuth of 270 degree')
```

A.4 frequencydomain.m

```
Fs = 44100;

% Horizontal plane
Y = fft(E_00R, 1024);
temp = (Y.* conj(Y)) .^ .5;
Pyy = 20 * log(temp);
f = Fs * (0 : 512) / 1024;
[X, Y] = meshgrid(f, 0 : 71);
Z = Pyy(1 : 513, :)';
figure(1)
mesh(Z)

Y = fft(E_00L, 1024);
temp = (Y.* conj(Y)) .^ .5;
Pyy = 20 * log(temp);
f = Fs * (0 : 512) / 1024;
[X, Y] = meshgrid(f, 0 : 71);
Z = Pyy(1 : 513, :)';
figure(2)
mesh(Z)

% Median plane
azimuth_0_L( :, 1) = E_40L( :, 1);
azimuth_0_L( :, 2) = E_30L( :, 1);
azimuth_0_L( :, 3) = E_20L( :, 1)
azimuth_0_L( :, 4) = E_10L( :, 1)
azimuth_0_L( :, 5) = E_00L( :, 1)
azimuth_0_L( :, 6) = E10L( :, 1)
azimuth_0_L( :, 7) = E20L( :, 1)
azimuth_0_L( :, 8) = E30L( :, 1)
azimuth_0_L( :, 9) = E40L( :, 1)
azimuth_0_L( :, 10) = E50L( :, 1)
azimuth_0_L( :, 11) = E60L( :, 1)
azimuth_0_L( :, 12) = E70L( :, 1)
azimuth_0_L( :, 13) = E80L( :, 1)
azimuth_0_L( :, 14) = E90L( :, 1)

Y = fft(azimuth_0_L, 1024);
temp = (Y.* conj(Y)) .^ .5;
Pyy = 20 * log(temp);
f = Fs * (0 : 512) / 1024;
[X, Y] = meshgrid(f, 0 : 13);
Z = Pyy(1 : 513, :)';
figure(3)
mesh(Z)

azimuth_0_R( :, 1) = E_40R( :, 1);
azimuth_0_R( :, 2) = E_30R( :, 1);
azimuth_0_R( :, 3) = E_20R( :, 1)
azimuth_0_R( :, 4) = E_10R( :, 1)
azimuth_0_R( :, 5) = E_00R( :, 1)
```

```
azimuth_0_R( :, 6) = E10R( :, 1)
azimuth_0_R( :, 7) = E20R( :, 1)
azimuth_0_R( :, 8) = E30R( :, 1)
azimuth_0_R( :, 9) = E40R( :, 1)
azimuth_0_R( :, 10) = E50R( :, 1)
azimuth_0_R( :, 11) = E60R( :, 1)
azimuth_0_R( :, 12) = E70R( :, 1)
azimuth_0_R( :, 13) = E80R( :, 1)
azimuth_0_R( :, 14) = E90R( :, 1)

Y = fft(azimuth_0_R, 1024);
temp = (Y.* conj(Y)) .^ .5;
Pyy = 20 * log(temp);
f = Fs * (0 : 512) / 1024;
[X, Y] = meshgrid(f, 0 : 13);
Z = Pyy(1 : 513, :)';
figure(4)
mesh(Z)
```

A.5 tone.m

```
% To create a test tone with 1 kHz frequency and 1 second longth.

Fs = 44100;
fo = 1000;
T = 1 / Fs;
t = 0 : T : 1; % tone of 1 seconds, the sampling rate is 44.100KHz.
tone = 0.84 * sin(2 * pi * fo * t);
tone = tone';
Y = fft(tone, 1024);
temp = Y.* conj(Y) .^ 0.5
Pyy = 20 * log(temp);
f = Fs * (0 : 512) / 1024;
figure(1)
plot(f, Pyy(1 : 513))
xlabel('Hz')
ylabel('dB')
grid on

wavplay(tone, Fs)
```

A.6 threeDsystem.m

```
% This code is to implement a simple 3D sound system
S = size(pace);
for i = 0 : 15
    x = i + 246;; % to choose a pair of HRTFs. x is between 246 and 276(elevation 30 degree, increment size
of azimuth is 6 degree).
    L_HRTF = HL(:, x);
    R_HRTF = HR(:, x);
    % Each filter is 128-bytes long and the sampling rate is 44.1KHz.
    % The tone signal is 44101-bytes long and the sampling rate is 44.1KHz.

    phi = i * 6 / 180 * pi;
    dist = 1.4;
    d = 0.1;
    Vs = 343

    %IT_L = sqrt((1.4 * cos(phi) + 0.1) .^ 2 + (1.4 * sin(phi)));
    %IT_R = sqrt((1.4 * cos(phi) - 0.1) .^ 2 + (1.4 * sin(phi)));
    %ITD = round((IT_L - IT_R) / Vs * Fs);
    ITD = d / Vs * (phi + sin(phi)) * Fs; %-pi/2 < phi < pi/2

    IID = 1; % set the intensity of both signals at the zero azimuth is 1 while the distances to both ears are
1.404m.
    stand_dist = (dist - d) .^ 2;
    IID_L = stand_dist / ((abs(1.4 * sin(phi) - 0.1)) .^ 2 + (1.4 * cos(phi)) .^ 2);
    IID_R = stand_dist / ((abs(1.4 * sin(phi) + 0.1)) .^ 2 + (1.4 * cos(phi)) .^ 2);

    lefts(S * i + 1 : S * (i + 1)) = IID_L * fftfilt(L_HRTF, pace);
    rights(S * i + 1 : S * (i + 1)) = IID_R * fftfilt(R_HRTF, pace);

    if ITD <= 0
        rights(S * i - ITD + 1 : S * (i + 1)) = rights(S * i + 1 : S * (i + 1) + ITD);
        rights(S * i + 1 : S * i - ITD) = 0;
    elseif ITD > 0
        lefts(S * i + ITD + 1 : S * (i + 1)) = lefts(S * i + 1 : S * (i + 1) - ITD);
        lefts(S * i + 1 : S * i + ITD) = 0;
    end

    ITD

end
    y = [lefts' rights'];
    %wavplay(y, Fs)
    wavwrite(y, Fs, 'tone')
```

Vita

Dayu Yang

Dayu Yang was born in Chengdu, Sichuan, China. He attended the Chongqing University of Posts and Telecommunications from 1992 to 1996, and graduated with a Bachelor of Science degree in Communications Engineering in 1996. He came to the University of Tennessee, Knoxville in the Fall of 2001 for graduate studies in Electrical Engineering.