Fourier beamformation of multistatic synthetic aperture ultrasound imaging - DTU Orbit (08/11/2017)

Fourier beamformation of multistatic synthetic aperture ultrasound imaging

A new Fourier beamformation (FB) algorithm is presented for multistatic synthetic aperture ultrasound imaging. It can reduce the number of computations by a factor of 20 compared to conventional Delay-and-Sum (DAS) beamformers. The concept is based on the wavenumber algorithm from radar and sonar in the frequency domain, which is extended to a multistatic configuration. Window functions are used to reduce the sidelobe levels. Field II simulated data have been used to evaluate the results in terms of point spread function, resolution, contrast, and processing time. Lateral resolutions of 0.75 mm and 0.82 mm are obtained for FB and DAS on simulated point target data. Corresponding axial resolutions are 0.33 mm for FB and 0.35 mm for DAS. The cystic resolution of point targets at different depths for −20 dB and −6 dB demonstrates a better resolution for FB at all depths. A cyst phantom was also used to calculate the contrast ratio, which is 94.04% and 94.72% for DAS and FB, respectively. The corresponding processing times are 118 sec and 2186 sec for FB and DAS. Results show that FB can reduces the processing time by the factor of 20.4 while retaining the image quality.

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