
LETTERS TO THE EDITOR

PERIODIC FADING OF MEDIUM WAVE RADIO SIGNALS

PERIODIC fading in short and medium wave signal strength records of distant transmitters taken during the early morning and late evening hours, was interpreted by previous investigators^{1,2} as due to the interference between two waves reflected either from one or two different layers of the ionosphere when one or both the layers have a slow vertical movement. They have calculated the vertical velocities of both the layers from the observed fading periodicities present in the records but their values showed wide variations. Further, it has not been possible for them to confirm these results by obtaining velocities by any other methods.

We have therefore undertaken a more detailed investigation on the determination of the

layer movements in the E-layer using medium wave transmissions. Using conventional equipment for recording signal strengths of continuous waves, fading records have been obtained for Madras A, Madras B and Cuttack medium wave transmissions during 0700-0800 hours. Almost all the records have shown complex periodic fading which is a superposition of three different types of periodic fading. Detailed analysis of the records revealed that there are two types of comparatively slow periodic fading and one type of a fairly quick period fading. All the three types of fading are interpreted as due to the interference of the three reflected waves from the E-layer. The slower periodicities correspond to 1 E & 2 E and 2 E & 3 E interference, whereas the quick period fading corresponds to the 1 E & 3 E interference. On the basis of this interpretation, the layer lifting velocities

are calculated from each of these periodicities and the values are found to be 2.15 metres per second for 1 E & 2 E interference, 2.29 m/s for 1 E & 3 E interference and 2.34 m/s for 2 E & 3 E interference. These values are found to be in good agreement with each other confirming the interpretation given by us. Further confirmation is obtained by the fact that both the 1 E & 3 E and 2 E & 3 E types of fading have lesser amplitude in view of the fact that the third hop from the E-layer is comparatively weak.

In the fading records obtained with Cuttack medium wave radio signals, the periodicities due to ground wave interference have also been noticed, possibly due to the appreciable signal strength of ground wave, Cuttack station being nearer (412 km.). The velocities as calculated from this periodicity are found to be in good agreement with the values obtained from the fading periodicities due to 1 E & 2 E interference. The average value of the velocity is about 2.37 m/s.

An important feature which has not been hitherto noticed is the decrease of velocity with time in the morning hours noticed in some of the records analysed. The analysis of such records is done by dividing it into four parts and taking the average velocity obtained from the different modes of interference present in each part. It is found that there is in general a definite decrease of velocity with time. At times, the variation is as much as 5 m/s to 2 m/s. It is evident from the above observation that the movement of the layer is rapid at the formation time during early morning hours and that it will gradually attain stable level after some time in the morning. Also it is found in most of the records that the amplitude or depth of fading decreases with time which can be explained as due to the increasing absorption of the radio waves in the intervening D-layer due to its growth in the early morning hours. Full details of these investigations will be published elsewhere.

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