SPATIAL CORRELATION OF SOLAR WIND TURBULENCE FROM TWO POINT MEASUREMENTS

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Interplanetary turbulence is the best studied case of low frequency plasma turbulence and the only directly quantified instance of astrophysical turbulence. Here, correlation analysis of interplanetary magnetic turbulence is carried out, using for the first time only proper two point, single time measurements, providing a key step in unraveling the space-time structure of interplanetary turbulence. Simultaneous magnetic field data from the Wind, ACE and Cluster 2 spacecraft are analyzed to determine the spatial correlation function, the correlation (outer) scale, and the inner (Taylor) microscale near Earth orbit. The correlation scale is determined to be 193 RE, the Taylor scale is 0.4 RE, and the effective magnetic Reynolds number is calculated to be 230,000 fromthe ratio of the Taylor scale and the outer scale.