# The phase speed of EUV propagating disturbances: robust measurement, temperature-dependency, and seismological application.

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March 23, 2012

**Abstract**

We designed Cross-Fitting Technique (CFT), 2D Coupled Fitting (DCF) and Best Similarity Match (BSM) techniques to measure the apparent phase speed of coronal propagating EUV disturbances in the time-distance plots obtained with AIA and other imaging instruments

The techniques are applied to the analysis of propagating disturbances observed in the coronal fan-structure at active region NOAA11330 on 27 Oct 2012. The average projected propagating speed is measured at $47.6 \pm 0.6$ km/s and $49.0 \pm 0.7$ km/s for running difference and background-removed and normalised signal respectively, with periods of $179.7 \pm 0.2$ s and $179.7 \pm 0.3$ s.

Time-distance plots with background removal and normalisation are found to be more consistently measured with little effect from the choice of detrending time, while running difference plots are effectively measured with only certain range of selections of lag time. CFT provides reliable measurement on relatively good samples. DCF is very sensitive to the initial guess and is only optimised in measuring one of the parameters. BSM is robust in measuring all samples and very tolerant to image processing and regularisation (smoothing).

We also analysed propagating disturbances in an off-limb fan structure on 06 to 07 Mar 2012. In our preliminary analysis, we found the period is about 8 min, propagating speed is roughly ~80 km/s. The detection length of the disturbances is about 30-50 Mm, much longer than TRACE studies.