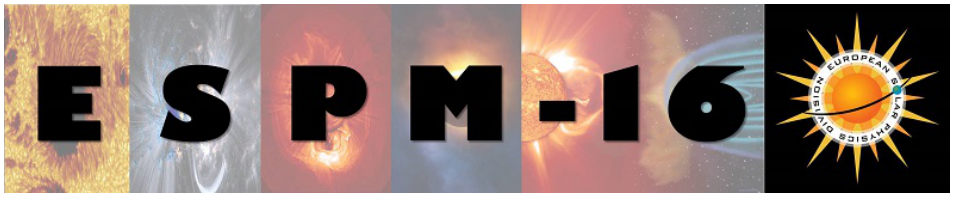

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Stability of shock fronts in the partially-ionised lower solar atmosphere

Thursday, 9 September 2021 09:13 (13 minutes)

Shocks are regularly observed in the lower solar atmosphere, for example, umbral flashes which have average lifetimes of roughly a minute. For ideal magnetohydrodynamic (MHD) theory, slow-mode shocks should become unstable to the corrugation instability, triggered by the inhomogeneities in the solar atmosphere. However, the lower solar atmosphere is partially ionised, and the presence of a neutral species can stabilise the shock front. Here I present numerical results to investigate the stability conditions for a partially-ionised slow-mode shock with regards to the corrugation instability. Our results indicate that a stability range can be determined based on physical parameters of the system, where partially-ionised shocks are stable depending on the perturbation wavelength relative to the finite shock width. We relate these results to umbral flashes by estimating the wavelengths that could result in a stable shock front, and the observational consequences in terms of observing two-fluid effects in the lower solar atmosphere with the latest instruments.

Student poster?

Primary authors: SNOW, Ben (University of Exeter); HILLIER, Andrew (University of Exeter)

Presenter: SNOW, Ben (University of Exeter)

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