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Shocks and instabilities in the partially ionised plasma of the solar atmosphere

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Observations of the Sun reveal a rich array of dynamics throughout all levels of the solar atmosphere. In many cases, the observed dynamic motions are driven by the magnetic field. However, the lower solar atmosphere, i.e. the photosphere and chromosphere, is a partially ionised plasma, with most of the species being neutral. This means that the driver of the fluid motions cannot directly influence the fluid itself, this only happens through the interaction of neutral and charged species. In this talk I will look at two areas of research into partially ionised plasma dynamics, relating to MHD shocks and instabilities, which are of particular relevance to our understanding of the dynamic solar atmosphere. For shocks, the neutral fluids decouples from the magnetic field in the shock front, creating a broad shock transition that contains substructure, and can influence the stability of the shock. For instabilities, partial ionisation is found to change the growth rate and the effects of non-linear transport. To date studies using two fluid models are often highly idealised, but progress is being made to look at more realistic settings. I will review some of the recent advances.

Student poster?

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