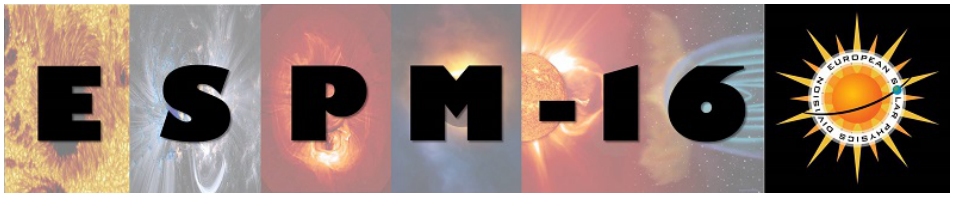

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Ionisation and recombination effects on current sheet dynamics in chromospheric partially ionised plasmas

Monday 6 September 2021 15:43 (13 minutes)

Fast magnetic reconnection plays a fundamental role in driving explosive dynamics and heating in the solar chromosphere. The reconnection time scale of traditional models is shortened by the onset of the coalescence instability, which forms a turbulent reconnecting current sheet through plasmoid interaction. Non-equilibrium ionisation–recombination processes can significantly alter the time scale of magnetic reconnection by changing the plasma composition, therefore it is essential to evaluate their contribution in the development of plasmoid coalescence. In this talk I investigate the role of ionisation and recombination in the development of fast magnetic reconnection in a partially ionised plasma through the study of the coalescence instability of plasmoids. Unlike the processes occurring in fully ionised coronal plasmas, relatively little is known about how fast reconnection develops in partially ionised plasmas (PIPs) of the chromosphere. I will present 1D and 2.5D preliminary simulations of a two-fluid model of a partially ionised plasma (PIP) and show how the dynamics change in the presence and absence of ionisation and recombination processes. In our 1D calculations, as the current sheet collapses, it drives a burst of ionisation. This results in the current of the current sheet growing at a slower rate than calculations without ionisation and recombination, and in a thicker current sheet. I will discuss the consequences of ionisation and recombination on chromospheric plasmas, based on our 2.5D simulations.

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