M17b Resistive flux emergence in a partially ionised atmosphere

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The dynamics of partially ionised plasma have been shown to have a significant impact on flux emergence and reconnection events in the photosphere and chromosphere. The process of resistive emergence where flux emerges and reconnects to form coronal loops could be greatly effected by this process. In this study, the impact of neutral dynamics, modelled by Cowling resistivity in the induction equation, on the resistive emergence process is investigated.

Simulations of reconnection between two emerging flux sheets in a partially ionised atmosphere are presented. 3 cases are studied: Fully ionised, partially ionised using a simple atmosphere and a partially ionised atmosphere with the ionisation fraction being determined by a realistic temperature profile. It was found that the partially ionised atmosphere caused the current sheet to thin driving faster reconnection and caused the magnetic flux to accumulate in the photosphere before erupting into the Corona.