



Analytical 3D Magnetohydrostatic Equilibria for Modelling Solar Magnetic Fields

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Accurately measuring the magnetic field in the solar corona is extremely difficult and hence our knowledge of the coronal magnetic field structure relies on the extrapolation of magnetic field measurements in the lower regions of the solar atmosphere into the corona. Whereas the solar corona generally is a domain of low plasma-beta with largely force-free magnetic fields, this is not the case for the lower parts of the solar atmosphere where the magnetic is measured and the magnetic fields there should be calculated using (non-force-free) magnetohydrostatic equilibria. In this contribution we present a new family of analytical magnetohydrostatic equilibria which could be used as relatively simple and computationally cheap alternative to numerical modelling methods. These equilibria have the capability of combining a non-force-free layer with a domain of linear force-free magnetic field, including a smooth transition between these two domains. The methodology used to calculate these equilibria is based on work by Low (e.g. Low 1991) in the form given by Neukirch and Rastätter (1999).

Low, B.C., ApJ 370, 427

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