Nonequilibrium Ionization Analysis of a Coronal Shock Driven by a Coronal Mass Ejection

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Abstract

In this study we present a nonequilibrium ionization analysis of a coronal shock driven by a coronal mass ejection (CME) observed on June 13, 2010. Using the Solar Dynamics Observatory’s Atmospheric Imaging Assembly (AIA), observations of the CME were made in the 171, 193, 211, and 335Å channels with a corresponding spherical shock present in the 193 and 211Å channels. We constrain previously reported pre and post shock electron temperatures of 1.8 and 2.8 MK at various positions along the shock using a fast FORTRAN program to solve the time-dependent ionization equations for abundant elements in the coronal plasma. Future work will use these temperatures and densities with the magnetohydrodynamic jump conditions to derive further information about the shock.

Keywords: time-dependent ionization, shock waves, coronal mass ejections

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