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Poster

1. Fundamental physical processes and modeling

Modelling, synthetic imaging and high-resolution observations of fine structures of prominences and filaments

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To understand links between the distribution of the prominence plasma, configuration of its magnetic field and observations of the prominence/filament fine structures obtained in UV/EUV, optical and radio domains from various vantage points, we need complex 3D prominence models. The first such a model was developed by Gunr&Mackay (2015). This 3D whole-prominence fine structure (WPFS) model allows to simulate entire prominences including their numerous fine structures. It combines a 3D magnetic field configuration of an entire prominence obtained from NLFF simulations, with a detailed description of the prominence plasma located in magnetic dips and distributed along hundreds of fine structures. The modeled prominence plasma has a realistic distribution of the density and temperature, including the prominence-corona transition region. Recently, we have included into the model a new magnetic field configuration of a polar crown prominence based on the LFF extrapolations of the photospheric flux distributions.

Such a complex 3D model can provide comprehensive information on the 3D distribution of the prominence plasma and magnetic field that can be consistently studied both as a prominence on the limb and as a filament on the disk. For example, 3D WPFS model can provide high-resolution synthetic images produced in the optical Hα line, at the SMM radio wavelengths, or in the Si IV (1402.8 Å) FUV line observed by IRIS. The model may thus serve as a complex, yet well-controlled environment for testing and development of techniques for analysis of the state-of-the-art observations. As en example may serve the analysis of the thermal properties of the prominence/filament fine structure plasma using the ALMA observations, or the development of inversion techniques for the inference of the magnetic field from the spectro-polarimetric observations.

We will present the capabilities of the 3D WPFS model and its potential for the analysis and interpretation of high-resolution observations of the prominence and filament fine structures, such as those obtained by IRIS.