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# Numerical Modeling of Prominence Dynamics, Eruption and Coronal Waves Propagation Using MPI-AMRVAC

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Solar prominences are the birthplaces of coronal mass ejections, making studies of their pre-eruptive dynamics crucial for space weather. In this talk, I will review our most recent numerical studies of prominence dynamics with MPI-AMRVAC code.

Our investigation extends to the eruption evolution and the generation of coronal waves, which propagate over considerable distances through a magnetized medium and interact with flux rope prominence. This study relies on a numerical experiment performed with the MPI-AMRVAC code, using a gravitationally stratified corona and accounting for nonadiabatic effects. The initial magnetic field configuration consists of a dipole and a pre-existing flux rope in the low corona that suddenly erupts due to a 2.5D catastrophe.

The eruption gives rise to multiple energetic waves propagating throughout the magnetized corona. These waves ultimately reach distant prominences, evidently perturbing it. We generated synthetic images to increase our findings' comparability with SDO/AIA observations of similar events.

We analyzed and compared two scenarios with and without a uniform background magnetic field component aligned with the invariant direction. These scenarios result in different beta regimes and overall distinct evolutions of the eruption, variations in tearing instability within the current sheet, and differences in the propagation of coronal waves.

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