Radiation magnetohydrodynamic modeling of solar coronal dynamics

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We present highly dynamic simulations of solar corona that exhibit intermittent heating and brightening based on the radiation magnetohydrodynamic model. The recent development of observational instruments allows us to access a large amount of remote-sensing image of the solar atmosphere. Because of the high nonlinearity of the solar atmosphere, the interpretation of the observational data is becoming more difficult. One approach to overcome this difficulty of the observational interpretation is to compare the observational data with synthesized realistic numerical simulations more directly. Realistic model of the solar corona should take into accout various physical processes like the radiative transfer, non-ideal equation of states, and thermal conduction. Our radiation magnetohydrodynamic model RAMENS is one of such solvers that can model the realistic solar dynamics from the upper convection zone to the corona. Recently, we further develop this code by including the semi-relativistic correction of the Alfven wave and thermal conduction to avoid severe time stepping near the active region. This new code allows us to simulate the highly dynamic solar corona within a moderate numerical cost. In the presentation, we will report our implementation of the semi-relativistic correction and present new energetic coronal simulations.

Keywords: Sun, Corona, Simulation

