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Prominence dynamics induced by a distant eruption

Prominence oscillations are commonly known for their use in prominence seismology when the plasma and magnetic field properties are derived from the oscillatory properties such as periods, damping, and times. However, how the oscillations are induced in those dense and cold structures remains unclear. Observations from SDO/AIA, SMART showed the activations with the incoming waves, which could affect global prominence configurations. These waves were produced by eruptive events. In this study, we aim to obtain a full understanding of how the flux rope eruption generates disturbances and how the energy of those is trapped and induces prominence oscillations. We perform a 2.5D numerical experiment with MHD code MPI-AMRVAC using the magnetic field structure of two dipoles nested in gravitationally stratified corona. The converging and shearing footpoints motions serve for stable and eruptive flux rope formation. Since we include radiative cooling, background heating, and thermal conductivity, we form the prominence according to a levitation-condensation scenario: the denser plasma is levitated by the rising flux rope and condensed due to the thermal instability, which develops when background heating and thermal conduction cannot balance the radiative losses. We find that the eruption produces an energetic wave that reaches a distant prominence affecting its global configuration and triggering motions. Overall, the prominence dynamics are complex, showing a mixture of the oscillation of the different polarizations with respect to the magnetic field. We obtained the synthetic views, which show many details that may be important for future high-resolution observations.

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