M21b

Propagation of Slow-Modes through the Transition Region in Network Magnetic Elements

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From radiation magnetohydrodynamic (RMHD) simulations of the solar atmosphere we found a new mechanism for the excitation of longitudinal slow modes within magnetic flux concentrations by the convective downdrafts in the immediate surroundings of magnetic elements (so-called magnetic pumping, see Kato et al. 2011 ApJL, 730, L24).

The coupling between the external downdraft and the plasma motion internal to the flux concentration is mediated by the inertial forces of the downdraft that act on the magnetic flux concentration. These forces pump the internal atmosphere in the downward direction, which entails a fast downdraft in the photospheric and chromospheric layers of the magnetic element. Subsequent to the transient pumping phase, the atmosphere rebounds, causing a slow mode traveling along the magnetic flux concentration in the upward direction and developing into a shock wave in chromospheric heights. However, it's not yet clear how a shock wave can propagate through the transition region and reach the corona.

We will give an overview of the excitation mechanism of slow modes and also report on how much energy are deposited by propagating shock waves in the transition region between the chromosphere and corona in our RMHD simulations.