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E-Poster: Transverse Wave Induced Kelvin-Helmholtz Rolls in Spicules

Spicules may play a major role as energy conduits from the chromosphere to the corona. Two kinds of spicules have been proposed. Type II spicules differ from their type I counterparts mainly on their higher speeds, heating from chromospheric to at least transition region temperatures, their transverse motion (swaying and torsional), and multi-stranded structure. These characteristics suggest different physical mechanisms at the source and during the evolution of type II spicules. In this work we investigate with a 3D MHD model the role of transverse MHD waves and associated instabilities in spicules. Through optically thin and radiative transfer modelling we compare and find good agreement between the obtained dynamics in the model with new observations combining Hinode and IRIS. The Transverse Wave Induced Kelvin-Helmholtz (TWIKH) rolls lead to strand-like structure in imaging and spectra, coherent transverse dynamics among strands, fast disappearance through mixing with external (hotter) plasma, red and blue Doppler shift transitions and Doppler to line widths ratios that match the observed values for several spicules. For other cases we find a better match with simple rotation models, while simple torsional Alfvén wave models could not be matched. The obtained agreement suggests that TWIKH rolls may be responsible for the observed morphology and transverse dynamics in spicules. However, the model cannot produce the characteristic fast longitudinal speeds, which suggests that probably other mechanisms, such as magnetic reconnection in the lower atmosphere, play a major role in the generation of spicules, and that their morphology may be a by-product of the TWIKH rolls generated in the process.