3D NUMERICAL SIMULATIONS OF MHD WAVES IN SOLAR FLUX TUBE

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Recent high-resolution ground-based observations provide clear evidence for the existence of oscillations driven by magnetic twist in flux tubes. These torsional oscillations are associated with Alfven waves. It is of particular interest to study the excitation and propagation of torsional Alfven waves into the upper, magnetised atmosphere because they can channel photospheric energy into the corona.

Here we examine numerically the direct propagation of such torsional waves, driven at the foot-point of a solar magnetic flux tube, into a three-dimensional magnetised atmosphere representing the soar atmosphere between the photosphere and low corona. The simulations are based on fully compressible ideal magneto-hydrodynamical modelling. The model solar atmosphere is constructed based on realistic temperature and density stratification derived from VAL IIIF, and is most suitable perhaps for a bright network element or magnetic pore.

We discuss how torsional phosphoric motion can excite Alfven and other types of MHD waves that reach the upper parts of the solar atmosphere. We also discuss the energetic implications as far as heating is concerned. Finally, we briefly discuss the observational signatures of these waves.