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Slow Wave Propagation in Coronal Loops

I. De Moortel

University of St Andrews (ineke@mcs.st-and.ac.uk)

High cadence TRACE observations show that outward propagating intensity disturbances are a common feature in large, quiescent coronal loops, close to active regions. An overview is given of measured parameters of such longitudinal oscillations in coronal loops. The observed oscillations are interpreted as propagating slow magneto-acoustic waves and are unlikely to be flare-driven. A strong correlation, between the loop position and the periodicity of the oscillations, provides evidence that the underlying oscillations can propagate through the transition region and into the corona. A 1D theoretical model of slow magneto-acoustic waves, incorporating the effects of gravitational stratification, the magnetic field geometry, thermal conduction and compressive viscosity is presented to explain the very short observed damping lengths. The results of these numerical simulations are compared with the TRACE observations and show that a combination of the area divergence and thermal conduction agrees reasonably well with the observed amplitude decay. Additionally, the properties of slow MHD waves in a 2D model are investigated. Including a horizontal density variation causes phasemixing and coupling between slow and fast MHD waves, but it is shown that neither mechanism is likely to cause sufficiently rapid damping to explain the observations.