

DISSIPATION OF STANDING SLOW MAGNETOACOUSTIC WAVES IN HOT CORONAL LOOPS

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The damping of standing slow waves in hot ($T > 6$ MK) coronal loops of semicircular shape is revisited in both the linear and nonlinear regimes. Dissipation by thermal conduction, compressive viscosity, radiative cooling, and heating are examined for nonstratified and stratified loops. We find that for typical conditions of hot SUMER loops, thermal conduction determines the periodicity of damped oscillations, while the decay times are determined by compressive viscosity. Damping due to optically thin radiation is negligible. We also find that thermal conduction alone produces a slow decay of the density and velocity waves. Only when compressive viscosity is added do these waves damp out at the same rate of the observed rapidly decaying modes of hot SUMER loop oscillations, contrary to most current belief that have pointed to thermal conduction as the only leading mechanism. We compare the linear predictions with numerical hydrodynamics calculations. Under the effects of gravity nonlinear viscous dissipation leads to a reduction of the decay time compared to the homogeneous case. This is one major difference with the linear prediction that the damping rates are barely affected by gravity.