NON-AXISYMMETRIC OSCILLATIONS OF THIN TWISTED MAGNETIC TUBES

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Since transverse oscillations of coronal loops were first observed by TRACE, and subsequently interpreted as fast kink oscillations of magnetic flux tubes, the theory of non-axisymmetric oscillations of magnetic tubes remains among hot topics in solar physics. We study non-axisymmetric oscillations of a thin straight weakly twisted magnetic tube with the density varying in the longitudinal direction. Using asymptotic expansions with the ratio of tube radius to its length as a small parameter, we derived the second order differential equation describing the tube displacement. Together with the zero boundary conditions at the tube ends this equation forms the Sturm-Liouville problem determining the eigenfrequencies and eigenmodes of the tube oscillation. The dependence of the eigenfrequencies on the density stratification and magnetic twist is investigated. The implication of the obtained results on coronal seismology is discussed.