

Kink oscillations in Coronal loops and Prominence threads

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Abstract

We study the magnetohydrodynamic oscillations of longitudinally inhomogeneous magnetic tubes to shed light on the problem of the frequency ratio for coronal loops and prominence threads.

After using specific density profiles (main request here is that density should have peak (maximum) at the center of the tube) and some boundary conditions, we get a transcendental dispersion equations with Bessel functions. Then we solve these equations as analytically (in some approximations) as numerically and get following main result: The frequency ratio of second and first harmonics approximately is 3, conversely from homogeneous case where such ratio equal 2.

Then comes its explanations with dependence on parameters (with appropriate graphs). In general, we can say that stronger inhomogeneity (inhomogeneity parameter) means stronger 'trap' for waves and this is like holding by potential energy.