Geophysical Research Abstracts
Vol. 15, EGU2013-1786, 2013
EGU General Assembly 2013

Non-reflecting wave propagation in coronal magnetic loops

Mikhail Ruderman (1), Nikolay Petrukhin (2), Tatiana Talipova (3), Efim Pelinovsky (2,3)

(1) Math Department, University of Sheffield, UK, (2) National Research University – Higher School of Economics, Nizhny Novgorod, Russia , (3) Applied Physics Institute, Department of Nonlinear Geophysical Processes, Nizhny Novgorod, Russia

Propagating kink wave are ubiquitously observed in solar magnetic wave guides. We consider the possibility that these waves propagate without reflection in spite of the presence of inhomogeneity. We briefly describe the general theory of non-reflective one-dimensional wave propagation in inhomogeneous media. The general theory is then applied to the kink wave propagation in coronal loops. We consider a coronal loop of half-circle shape embedded in an isothermal atmosphere, and assume that the plasma temperature is the same inside and outside the loop. We show that non-reflective kink wave propagation is possible for a particular dependence of the loop radius on the distance along the loop. A viable assumption that the loop radius increases from the loop footpoint to the apex imposes the lower limit on the loop expansion factor, which is the ratio of the loop radii at the apex and foot points. This lower limit increases with the loop height, however even for a loop with the height twice larger than the atmospheric scale height it is small enough to satisfy restrictions imposed by observation. Hence, we conclude that non-reflective propagation of kink waves is possible in a fairly realistic model of coronal loops.