ESPM15 Talk Abstract

The emerging field of solar magneto-seismology has become a crucial tool in developing

our understanding of solar structures. We derive the dispersion relation governing the propagation of magneto-acoustic waves along a magnetic slab of homogeneous plasma enclosed on its two sides by semi-infinite plasma of different densities and temperatures, thereby generalising the classic symmetric magnetic slab model. We illustrate the eigenmodes using 3D animations to demonstrate the change in character of symmetric sausage and kink modes when the slab is asymmetric, introducing the terms quasi-sausage and quasi-kink to describe the asymmetric eigenmodes. Two novel magneto-seismology tools are discussed: the amplitude ratio method and the minimum perturbation shift method. These tools can be applied to MHD wave observations to approximate the local magnetic field strength, which is traditionally difficult to measure, in inhomogeneous structures such as elongated magnetic bright points and sunspot light bridges.

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The emerging field of solar magneto-seismology has become a crucial tool in developing our understanding of solar structures by means of studying MHD waves. Here, we derive the dispersion relation governing the propagation of magneto-acoustic waves along a magnetic slab of homogeneous plasma enclosed on its two sides by semi-infinite plasma of different densities and temperatures, thereby generalising the classic symmetric magnetic slab model put forward by Roberts, 1981. We illustrate the eigenmodes using 3D animations to demonstrate the change in character of symmetric sausage and kink modes when the slab is asymmetric, introducing the terms quasi-sausage and quasi-kink to describe the asymmetric eigenmodes. Two novel solar magneto- seismology tools are discussed: the amplitude ratio method and the minimum perturbation shift method. These tools can be applied to MHD wave observations to approximate the local magnetic field strength, which is traditionally difficult to measure, in inhomogeneous structures such as e.g. elongated magnetic bright points and sunspot light bridges. Finally, we will discuss a further generalisation to the model by adding magnetic field to the external plasma, making the model more applicable to e.g. prominence oscillations or wave propagation at the boundaries of coronal holes.