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Exploring wave propagation in the outer solar corona using the Accelerating Expanding Box

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Magnetic field depressions are ubiquitous in the solar wind: in situ observations provide evidence of such drops in the magnetic field magnitude at different latitudes (from the ecliptic plane up to near-polar latitudes) over a wide range of heliocentric distances (0.3 – 17 AU). Such structures are almost pressure balanced and quasi perpendicular to the average magnetic field. In spite of such well-documented observations, the question remains as to where an how these magnetic field depressions are generated, and weather they are stable or not. Two major paradigms are usually invoked to interpret these magnetic structures, the mirror instability on the one hand, and solitary waves on the other hand. In addition, a realistic description of solar wind dynamics requires that the basic effects of its inhomogeneity are taken into account. We introduce here the "Accelerating Expanding Box" model for the purpose of studying wave propagation from the accelerating region of the solar wind, where the solar wind is most inhomogeneous, out to large heliocentric distances. We propose a self-consistent study of the evolution of magneto-hydrodynamic waves by showing first results on wave mode coupling and subsequent formation of structures due to the expansion. The aim is to highlight the role of the solar wind expansion in both the temporal and spatial evolution of MHD waves propagating out from the lower corona, and how the inhomogeneity, which sets in because of the radial expansion of the solar wind, act to modify the properties of the waves themselves.