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Dear Editor

Please accept our article for publication in the MDPI Physics Journal, Special Issue "A Themed Issue in Honor of Professor Marcel Goossens on the Occasion of His 75th Birthday".

The aim of the work reported in this paper is to gain understanding of solar global oscillations and the propagation characteristics of p-mode oscillations in the highly gravitationally stratified magnetic solar atmosphere. We present a comparison of the analysis of results from observations of ubiquitous intensity oscillations and numerical simulations of potential signatures of global oscillations of the solar atmosphere. 3D numerical magnetohydrodynamic (MHD) simulations of a model solar atmosphere with a uniform vertical cylindrically symmetric magnetic field, employing simulation drivers resulting in oscillations that mimic the behaviour of p-mode oscillations, are presented. The simulations were run for different values of the magnitude of the magnetic field and a p-mode driver with a fixed period of 300 s. For the observational study, a typical active region was selected. We report results for the temporal analysis of the observational data for a region containing a small sunspot (solar pore). The paper reports the variation of the energy flux and oscillation frequency of the magnetosonic modes and examines their dependence on the magnetic field strength. The comparison with observational data indicate the presence of oscillation signals with a frequency close to that measured for the simulated results. We conclude that magnetic regions of the solar atmosphere are favourable regions for the propagation of energy by slow magnetosonic modes. The results exhibit a frequency shift of the oscillations higher in the lower solar atmosphere, for different values of the magnetic field. The numerically obtained periodic behaviour , even in this simplified model atmosphere, is consistent with the observational data, featuring similar frequencies based on the intensity times series of images taken by the Solar Dynamics Observatory.

Regards
Michael Griffiths