High-frequency Torsional Alfvén Waves as an Energy Source in the Solar Corona

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Abstract

Generation of radiation and supersonic wind from the Sun's corona requires a large input of energy ($\sim 10^2 - 10^4\ W\ m^{-2}$) to balance these losses. The role of magnetohydrodynamic (MHD) waves has been examined as one of the primary candidates to energize the solar atmosphere and transporting energy for the coronal heating and wind acceleration. Direct evidence of these waves and their dissipation are not yet fully established though. In this talk, we discuss the first direct observation of the high-frequency Torsional Alfvén waves in the fine structured magnetic flux tubes in the solar atmosphere. Using a stringent 3-D numerical model, we find that such high-frequency waves are capable of transferring $\sim 10^{-3}\ W\ m^{-2}$ energy into the overlying corona that is a sufficient Poynting flux not only to heat it but also to originate the supersonic solar wind. The future implications of these new findings are also discussed.