Effect of Quantum Forces on Electromagnetic Ion Waves in a Spin Quantum Plasma

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Abstract

In this study, the behavior of electromagnetic ion waves in a warm plasma is investigated considering the quantum forces related to the electron spin and the quantum diffraction effects of all plasma particles. The results show that the quantum correction associated with the quantum potential of ions and electrons has a significant effect on the dispersion of waves and introduces non-linear terms in the dispersion relation. We also find that the spin of electrons contributes to the linear part of the dispersion relation via modification of the Alfven velocity. Moreover, the spin effect of electron decreases the contribution of quantum potential on the dispersion of wave modes. Finally, some special cases in classical and quantum regimes are discussed.

Keywords: Quantum plasmas, Spin effect, Electromagnetic ion waves, Dispersion relation.

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