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Amplitude modulation of ion acoustic waves in a magnetized spin quantum plasma NARESHPAL SINGH SAINI, KULDEEP SINGH, Guru Nanak Dev University, Amritsar, India-143005 — Degenerate plasmas are found to play an important role in dense astrophysical objects like white dwarfs and neutron stars. In such a plasma, the density is very high and the temperature is very low. The presence of a strong ambient magnetic field qualitatively changes the properties of atoms, molecules and condensed matter. Ion- acoustic waves are among the most well studied electrostatic modes in both linear and nonlinear regimes in dense astrophysical plasmas. In the present investigation, the modulational instability of ion acoustic waves and evolution of rogue waves have been investigated in a dense magnetized plasma by employing the spin-evolution quantum hydrodynamic model. We have considered degenerate electrons having spin-up and spin-down relative density effects and non-degenerate cold ions. The nonlinear Schrödinger equation is derived using the multiple scale perturbation technique and solved numerically to study the effect of various plasma parameters on the modulational instability.The parametric role of the spin density polarization ratio on the amplitude and width of solitary structures is also investigated. The spin-up and spin-down polarization of degenerate electrons are considered via polarization index. The quantum tunneling effects are also taken into account by considering the Bohm potential term in the corresponding momentum equations of degenerate electrons. The findings may also be applicable to astrophysical plasmas (e.g., neutron stars/pulsars) where the spinning effect of fermions is included to describe the dense astrophysical plasma system.

Nareshpal Singh Saini
Guru Nanak Dev University, Amritsar, India-143005

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