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## Quantum generalization of the Appleton- Hartree formulation

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### Abstract

The purpose of this paper is to present a new generalized form of the Appleton-Hartree formulation. To that end, we use a system of linearized quantum plasma equations to include quantum corrections due to the quantum force produced by the density fluctuations of electrons. Dispersion relations and their modifications resulting from quantum effects are derived for both quasi-parallel and quasi- perpendicular wave modes. In comparison to the previous studies, the results show that quantum effects can modify the dispersion of the whistler, helicon, left-handed, ordinary and extraordinary waves. Furthermore, the analysis of results, in particular cases, confirms those of the previous studies and, in a few cases, leads to known relationships in classical plasma physics.

**Keywords:** quantum plasma, quantum force, electromagnetic waves

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