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The characteristics of acoustic solitons in non-thermal plasmas

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Acoustic solitons are fundamental features of nonlinear dispersive plasmas which have been widely reported to exist in the solar wind and planetary magnetosphere. In this study general formulations are developed for acoustic solitons based on hybrid kinetic and fluid models with non-thermal distribution which is a profound characteristic of solar system plasmas. Weakly nonlinear and fully nonlinear solutions for acoustic solitons are derived and the issue of whether the suprathermal components may reverse the polarity of electric potential is particularly addressed.