The Nonlinear Langmuir Waves in a Multi-ion-Component Plasma

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Abstract: We investigated the nonlinear Langmuir waves in a multi-ion-component low-temperature plasma. Beginning with the fluid theory of plasma, and taking fully nonlinear response of the low-frequency ion motion into account, we derived a set of equations governing the nonlinear coupling of the amplitude of the Langmuir wave and the low-frequency perturbation density. Using the Sagdeev potential method, we analyzed the characteristics of solitary wave. In the limit of small amplitude, the envelope soliton was found. Our investigation demonstrates that the properties of soliton in a multi-ion-component plasma are different from those of soliton in an electron-ion plasma.

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