

# Linear and nonlinear electromagnetic and electrostatic instabilities in a plasma with two ion beams

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Linear and nonlinear properties of a plasma system with a proton and an alpha-particle beam, are studied. It is shown that the presence of a second beam can change the linear and nonlinear stability thresholds of the magnetosonic instabilities. Since the nonlinear dispersion relation of the nonlinear waves has 14 roots, the system is very rich in parametric decays. There are parametric decays which clearly cannot be present in a one beam system. These parametric decays are of the decay type, modulational, and essentially electromagnetic beat wave instabilities. In a previous paper (Gomberoff, 2007b), the stabilization properties of the magnetosonic instability triggered by the presence of a large amplitude Alfvén waves for fix temperature were studied. Here the study is extended to large amplitude waves belonging to the dispersion branch having a resonance at the proton gyrofrequency, for several temperature values. It is shown that the threshold amplitude for stabilization can suffer d