

New parametric decays of proton beam-plasma electromagnetic waves

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Ion beam-plasma interactions are the source of wave activity in several space environments. Therefore the study of these waves and their parametric decays are very important in space physics. Thus we study parametric decays of right-hand polarized proton beam-plasma waves including the effect of the beam. It is shown that there are new instabilities due to the beam and the associated ion acoustic waves. The branch of the linear dispersion relation corresponding to the beam has negative energy so that whenever this branch participates in a decay, the corresponding instability should lead to an explosive instability. Some explosive behavior has indeed been found in simulation results involving right-hand polarized waves. Since the free-energy source of the linear beamplasma instabilities is the beam energy, one expects the beam speed to decrease as the waves grow and experience nonlinear decays. Therefore we study the effect of varying beam velocity in the parametric decays. It is shown