

Parametric decays of a linearly polarized electromagnetic wave in an electron-positron plasma

Gomberoff, L.

Muñoz, V.

Galvão, R. M.O.

We study the parametric decays of a large amplitude, linearly polarized electromagnetic wave in an electron-positron plasma. We include harmonic generation, the ponderomotive force, and weakly relativistic effects. It is shown that when $v_{\text{EA}} < c$ (v_{EA} is the electroacoustic velocity, c is the speed of light, and v_{ph} is the phase velocity of the electromagnetic wave), there are two instabilities. One is an ordinary decay instability, in which the pump wave decays into a sideband wave, propagating backward relative to the pump wave, and an electroacoustic mode propagating forward. The other is an essentially electromagnetic nonresonant modulational instability (which is due to higher order effects of the pump wave amplitude), in which the pump wave decays into two sideband waves. When $v_{\text{EA}} > c$ there is a modulational nonresonant instability, and an ordinary modulational instability, in which the pump wave decays into