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Dynamic Characteristics of Growing Modes of Raman Instability from Intense Laser Beam Propagating Through Plasma

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Abstract: An essential dispersion relation, which can describe the dynamic properties of stimulated Raman scattering instability as a laser beam propagates through plasmas, is derived analytically. The development of growth mode, angle distribution, and temperature dependence of the instabilities are presented by solving this dispersion relation numerically. A significant dynamic characteristic has been revealed that the temperature increasing of the electron would result in redshift of scattered spectrum at high laser intensities. Furthermore, a novel modulational instability with double-peak temporal structure appears in a limited density region because of the coupling of scattered upshift and downshift waves.

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