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Investigation of longitudinal relativistic effect on stimulated Raman backscattering by using one-dimensional Vlasov-Maxwell simulations QING WANG, ZHANJUN LIU, CHUNYANG ZHENG, Peking Univ, CHENGZHUO XIAO, Hunan Univ, QINGSONG FENG, Peking Univ, HAOCHU ZHANG, Institute of Applied Physics and Computational Mathematics, Beijing, 100094, China, XIANTU XIAN, Peking Univ — The longitudinal relativistic effect on stimulated Raman backscattering (SRBS) is investigated by using one-dimensional (1D) Vlasov-Maxwell simulations. Using a short backscattered light seed pulse with a very small amplitude, the linear gain spectra of SRBS in strongly convective regime is presented by combining the relativistic and non-relativistic 1D Vlasov-Maxwell simulations, which is in excellent agreement with the steady-state linear theory. Meanwhile, we successfully predict the critical duration of the seed which can just trigger the kinetic inflation of the excited SRBS after the seed leaves the simulation box. In weakly convective regime, the transition from convective to absolute instability for SRBS can directly occur in linear regime due to the longitudinal relativistic modification. For the same pump, our simulations clearly demonstrate that the SRBS excited by a short and small seed pulse is a convective instability in the nonrelativistic case but becomes an absolute instability due to the decrease of the linear Landau damping from the longitudinal relativistic modification in the relativistic case.

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