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Title:Electromagnetic emission from laser wakefields in magnetized underdense plasmas
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Abstract:A wakefield driven by a short intense laser pulse in a perpendicularly magnetized underdense plasma is studied analytically and numerically for both weakly relativistic and highly relativistic situations. Owing to the DC magnetic field, a transverse component of the electric fields associated with the wakefield appears, while the longitudinal wave is not greatly affected by the magnetic field up to 22 Tesla. Moreover, the scaling law of the transverse field versus the longitudinal field is derived. One-dimensional particle-in-cell simulation results confirm the analytical results. Wakefield transmission through the plasma-vacuum boundary, where electromagnetic emission into vacuum occurs, is also investigated numerically. These results are useful for the generation of terahertz radiation and the diagnosis of laser wakefields.
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