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Title:Using the Lorentz Transformation to Simulate Terahertz-Range Superradiance of Picosecond Electron Bunches Moving in an Undulator Field
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Abstract:The possibility of generating multimegawatt pulses of radiation in the terahertz range based on the phenomenon of superradiance of picosecond electron bunches moving in an undulator magnetic field is demonstrated by means of numerical simulations using a particle-in-cell (PIC) code. The analysis has been carried out in a reference system K' moving with electrons, followed by a reverse transition to the laboratory reference system K, which significantly simplifies the simulation procedure due to the commensurate character of all spatial scales in the K' system, including the radiation wavelength, electron bunch length, and duration of a pumping pulse train (into which the undulator field is transformed).
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