Radiation from Relativistic Electrons in Periodic Structures "RREPS-15"



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Total Wake Field in a Rectangular Accelerating Structure with Dielectric Anisotropic Loading

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Dielectric lined waveguides are under extensive study as accelerating structures that can be excited by electron beams. Rectangular dielectric structures are used both in proof of principle experiments for new accelerating schemes and for studying the electronic properties of the structure loading material. Some of the materials used for the waveguide loading of accelerating structures (like sapphire) possess significant anisotropic properties. General solutions for the fields generated by a relativistic electron beam propagating in a rectangular dielectric waveguide have been derived using the mode expansion method for the transverse operators of the Helmholtz equation. An expression for the combined Cherenkov and Coulomb fields obtained in terms of a superposition of LSM and LSE-modes of rectangular waveguide with anisotropic dielectric loading has been obtained. Numerical modeling of the longitudinal and transverse (deflecting) wakefields has been carried out. It is shown that the dielectric anisotropy influences to excitation parameters of the dielectric-lined waveguide with the anisotropic loading.

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