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标题: Wakefield radiation generated by an electron bunch in a rectangular dielectric waveguide

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摘要: Vavilov-Cerenkov radiation generated by a relativistic electron bunch in a rectangular waveguide with a transverse-inhomogeneous dielectric filling is analyzed. A method is proposed for constructing an orthogonal basis of the transverse operator, which can be subsequently used for determining the wakefield of the relativistic bunch moving parallel to the waveguide axis. The dispersion equation for the structure is derived and the expressions for the wake field produced by such a bunch are obtained. The formalism described here forms the basis for calculating parameters of the accelerating structure for generator bunches of the Argonne Wakefield Accelerator (AWA) at the Argonne National Laboratory and the FACET complex of the SLAC accelerator. It is shown that using such structures, accelerating field gradients higher than 150 MV/m can be generated at frequencies 20-35 GHz and exceeding 1 GeV/m in the frequency range similar to 1 THz.

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