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Title:Cylindrical periodic surface lattice as a metadielectric: Concept of a surface-field Cherenkov source of coherent radiation
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Abstract:A two-dimensional (2D), cylindrical, periodic surface lattice (PSL) forming a surface field cavity is considered. The lattice is created by introducing 2D periodic perturbations on the inner surface of a cylindrical waveguide. The PSL facilitates a resonant coupling of the surface and near cutoff volume fields, leading to the formation of a high-Q cavity eigenmode. The cavity eigenmode is described and investigated using a modal approach, considering the model of a cylindrical waveguide partially loaded with a metadielectric. By using a PSL-based cavity, the concept of a high-power, 0.2-THz Cherenkov source is developed. It is shown that if the PSL satisfies certain defined conditions, single-mode operation is observed. © 2011 American Physical Society.