

Surface Modes in Structured Metal Surfaces

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Surface-bound modes in metamaterials forged by drilling periodic hole arrays in perfect-conductor surfaces will be explored by means of both analytical techniques and numerical solution of Maxwell's equations. It will be shown that these metamaterials cannot be described in general by local, frequency-dependent permittivities and permeabilities for small periods compared to the wavelength, except in certain limiting cases. New related metamaterials are shown to exhibit optical properties that are elucidated in the light of our simple analytical approach.