

Transmission of light by sub-wavelength square hole arrays in metallic films

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It is well known that the transmission of light through a sub-wavelength hole array drilled periodically in a metallic film shows a large enhancement compared to the transmission through one single hole of the same size [1]. This phenomenon was explained by the surface plasmon polaritons that are excited in a set of periodic holes. However, recent researches show several contradicting results and propose new models such as the composite diffracted evanescent wave model [2,3].

We theoretically investigate the transmission of light by sub-wavelength square hole arrays using the finite-difference time-domain method. The dependence of the transmission enhancement on the geometry of square hole arrays such as hole depth and size, and material properties are discussed.

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