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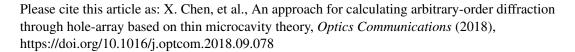
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An approach for calculating arbitrary-order diffraction

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An approach for calculating the optical diffraction c efficients through a subwavelength hole-array embedded in a susper ding "in metal layer is investigated based on the rigorous coupled wave a alysis method and thin microcavity theory. In this approach, the electromagnetic field components in the reflected and transmitted regions and diffraction coefficients of arbitrary orders are derived, resp. 'ivel, and some enhanced diffraction phenomena are discussed in a 'all, which are then verified via finite element (FE) simulatior. Sur equently, the effects of structural and material parameters of holey thin film including film material, incident angle, hole geor etry, and duty cycle of periodic array layer on the transmittance are nalyzed. The relevant results show that the duty cycle is the mair influence factor, and with the suitable duty cycle the optical trans nittance through the free-standing metal layer can be enhanced as Fign as 0.8 in the visible region. All these findings may be utilized in the wavelength tuning of subwavelength optics.

Key words subwavelength hole array; thin films; rigorous coupled wave analysis; extraordinary optical transmission; thin microcavity theory

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