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The Physical Basis of Enhanced Transmission Through Small Apertures in Metallic Films KEVIN WEBB, JIA-HAN LI, Purdue University — While the coupling of electromagnetic radiation through small apertures in a conducting screen is well understood based on the work of Bethe and, more rigorously, through an eigenmode expansion in the intervening waveguide, there has been recent interest in enhanced transmission phenomena. Greater coupling through the hole than might be expected based on the theory of apertures in perfectly conducting screens has been found. Studies with physical metals have focused on surface plasmon waves on the top and bottom surfaces of the metal film. We present numerical results for two-dimensional apertures in silver films with various geometries. The transmission is a function of the aperture width and film thickness variables. An analytical model is provided that explains the effect for silver and other metals.

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