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Theory of resonant acoustic transmission through subwavelength apertures

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The discovery of the phenomenon of extraordinary optical transmission through a two-dimensional array of subwavelength holes in a metallic film has opened a new line of research within optics. The key role played by surface plasmons in transferring light efficiently from the input side of the metal film to the output region was soon realized. This fundamental knowledge enabled extension of this surface-plasmon ability to achieve extraordinary optical transmission and strong collimation of light in a single hole surrounded by a finite periodic array of indentations. Here, we show how these ideas developed for electromagnetic radiation can be transferred to other classical waves such as acoustic waves.