Metadevices for the confinement of sound and broadband double-negativity behavior - DTU Orbit (09/11/2017)

Metadevices for the confinement of sound and broadband double-negativity behavior

We show that the acoustic response of perforated and elastically filled rigid screens can give rise to a broad landscape of tunable devices. We begin presenting deep-subwavelength transmission properties of a structured plate and demonstrate the immediate relationship to truly bound surface modes. We extend our theoretical model to analyze structured metal-fluid-metal wave guides for the confinement of sound and present exact expressions for the dispersion relations which describe the hybridization of resonances. We discuss the validity of our analytical model by direct comparison to full-wave simulations and use this technique in the search for broadband response in composite structures where the effective mass density and bulk modulus are simultaneously negative and exhibiting weak influences by viscous losses.

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