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Devices Based on Electromagnetic and Acoustic Metamaterials

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Message from the Guest Editors

Coordinate transformations have been applied to a wide range of classical waves and have led to the proposal of acoustic, mechanical, thermal, and electromagnetic cloaks. Furthermore, the possibility of tailoring the effective parameters has led to other exciting applications, including the demonstration of gradient index lenses for acoustic and mechanical waves. The acoustic and EM analogues of black holes are also promising devices that are of current interest in the field of metamaterials. The design of metasurfaces to control the transmission and reflective properties of impinging waves has become a hot topic in the last few years. For the last several decades, there have been designs for noise barriers based on phononic crystals, but only recently have we experienced a twist thanks to the introduction of metamaterials, allowing for the design of barriers with thicknesses much smaller than the wavelength of the impinging noise. More recently, the rapid development of additive manufacturing (3D printing) has enabled the fabrication of metamaterials devices that are impractical or impossible to make using traditional techniques.

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