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Acoustic Transparency by Switching of Phononic Bandgaps

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Acoustic transparency is here studied in two-dimensional phononic crystals made of hexagonal arrangements of layered cylinders. These layered cylinders, which have their acoustical properties radially dependent, can be achieved by using the recently proposed acoustical metamaterials [D. Torrent and J. Sanchez-Dehesa, New J. Phys., vol. 9, 323, 2007]. The transparency condition is here achieved by switching of the phononic bandgaps, which is governed by the scattering form factor of the acoustic parameters (bulk modulus and sound speed). Various dependence have been studied. The feasibility of this proposal is demonstrated by multiple scattering simulations of the proposed metamaterials [Work supported by NSF of USA and MEC of Spain].