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Acoustic cloaking by two-dimensional sonic crystals

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It has been previously shown that a two dimensional sonic crystal made of a periodic arrangement of solid cylinders in air behaves in the low frequency limit (homogenization) like an acoustic metamaterials with anisotropic effective density and isotropic effective bulk modulus [D. Torrent and J. Sanchez-Dehesa, *New J. Phys.* February 2008]. Here, the homogenization method is extended to the case of sonic crystals with two types of cylinders in the unit cell, and analytical expressions for the anisotropic effective density are then obtained. Moreover, it will be shown how these new acoustic metamaterials can be used to physically realize the solution for the acoustic cloaking proposed by Cummer and Schurig [*New. J. Phys.*, vol. 9, 45, 2007] [Work supported by MEC of Spain.]