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**Pendellösung phenomenon in two-dimensional sonic crystals**

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The phenomenon of "Pendelösung" oscillations, which is well known in X-ray diffraction [P.P. Ewald, Phys. Z. 14, 465 (1913); Ann. Phys. 54, 519 (1917); Rev. Mod. Phys. 37, 189 (1965)] is here predicted and experimentally verified for the case of two-dimensional sonic crystals made of hexagonal arrays of fluidlike cylindrical bars embedded in water. The dependence of diffraction intensity is studied as a function of layer thickness; i.e., of the layer number  $N$ . Nearly periodic oscillations have been observed at specific frequencies and the oscillation period is function also of the frequency. The periodic behaviour is evidence of the exchange of energy between two modes in the sonic crystal. [Work supported by MEC of Spain.]