Double Dirac cones in two-dimensional phononic crystals.[1] JUN MEI, South China University of Technology — By utilizing the accidental degeneracy of two double-degenerate Bloch eigenstates, a double Dirac cone is realized at the center of the Brillouin zone of a two-dimensional phononic crystal. Using a perturbation method, we demonstrate that the double Dirac cone is composed of two identical and overlapping Dirac cones whose linear slopes can be accurately predicted by the method from first-principles. A slab of the PC can be mapped onto a slab of zero refractive index material by using a standard retrieval method. Total transmission without phase change and energy tunneling at the double Dirac point frequency are unambiguously demonstrated.

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