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Ultra-broadband sound absorption by acoustic metamaterials¹ XUE JIANG, BIN LIANG, JIAN-CHUN CHENG, Nanjing University — Metamaterials with extraordinary properties unavailable in nature have opened up new design possibilities. Acoustic absorbers are of particular significances for acousticsbased devices and find applications in various scenarios, but subject to the inherent restriction of the natural acoustical parameters and limited operating bandwidth. We report the theoretical design, numerical calculation and experimental study on the realization of a metamaterial-based acoustic absorber with a simple yet efficient structure. The proposed acoustic absorber works in an ultra-broad band without restricted by the material type or requiring extra absorbing material. Such distinct effects stem from the localization and dissipation of different spectrum components at predesigned spatial positions. Theoretical predictions developed based on classical acoustic theory agree well with numerical and experimental results. The realization of ultra-broadband acoustic absorber with unique properties of stiffness and environmental-friendliness has paved the way for designing conceptual acoustic devices, and has potential applications in situations with special requirements on acoustic absorption characteristics.

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