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2-D Phononic Crystals – Unraveling the Effect of Void Distribution in Porous Structures PAI WANG, JONGMIN SHIM, KATIA BERTOLDI[1], Harvard University, KATIA'S GROUP TEAM[2] — Phononic crystals are periodic materials consisting of different constituents with the capability to control the propagation of elastic waves. In this study, the dispersion relations of two-dimensional phononic crystals with *circular voids* are investigated using Bloch-wave analysis. Porous patterns are derived from the *Laves tilings*, which are duals of the eleven *convex uniform tilings* of the *Euclidean plane*. Numerical simulations are performed on the microstructures using finite element method. Frequency band-gaps are calculated and compared among different geometric configurations, void-volume fractions, and material properties, providing valuable insight into the behavior of phononic crystals. The predictive technical procedure developed here offers opportunities for the design of mechanical wave filters that have many potential applications such as noise-cancelling devices, acoustic wave guides and vibration isolators.

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