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The gap structures and wave functions of two-dimensional quasicrystals for classical waves. YUN LAI, ZHAO-QING ZHANG, Department of Physics, The Hong Kong University of Science and Technology, Hong Kong, CHI-HOU CHAN, Department of Electronic Engineering, City University of Hong Kong, Hong Kong, LEUNG TSANG, Department of Electrical Engineering, University of Washington, US — By using the sparse-matrix canonical-grid (SMCG) method, we have performed large-scale multiple scattering calculations to study the gap structures and wave functions of two-dimensional quasicrystals for classical waves. As sample size is increased, we find self-similar-like evolution in the gap structures. We also find the self-similar state and large-size localized states. All these findings arise from the quasiperiodic long-range order. A self-similar state at band edge is identified in a large sample containing 33919 scatterers. A coherent picture is presented to describe the relationship between the self-similar-like evolution of gap structures and the formation of self-similar states.

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