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, CHIHOU 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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Date submitted: 29 Nov 2005

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