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Optimization of two-dimensional photonic bandstructure systems using steepest-descent algorithm FENG ZHANG, KITO HOLLIDAY, PAUL LAMMERT, VINCENT CRESPI, Department of Physics, The Pennsylvania State University — Conventionally, perturbation theory is used for the analytical study of small changes in a system. However, it can also be considered as an exact expression in differential form for the gradient of an objective function describing a system. Based on this idea, we have developed an efficient steepest-descent algorithm to optimize particular features of a photonic bandstructure system. We have applied the algorithm to optimize the size of the photonic bandgap at minimal dielectric contrast in two-dimensional photonic crystals on square and hexagonal lattices, obtaining non-zero complete gaps at very low dielectric contrast.

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