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Role of photonic bandgap in transverse localization of light in a disordered waveguide lattice

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The role of a prominent photonic bandgap (PBG) on the phenomenon of transverse localization of light in an evanescently coupled disordered one-dimensional semi-infinite lossless waveguide lattice has been investigated numerically. The interplay between the underlying photonic bandgap due to inherent periodicity and various levels of deliberately induced transverse disorder in it in the form of refractive index perturbation has been studied. We show that the PBG indeed plays an important role and it could help in achieving localized light even in a partially disordered lattice. An important outcome of this study revealed that PBG could be gainfully exploited to tailor the spectral window of light localization for specific applications.

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