

This is a review text file submitted electronically to MR.

Reviewer: Znojil, Miloslav

Reviewer number:

Address:

NPI ASCR, 250 68 Rez,
Czech Republic
znojil@ujf.cas.cz

Author: Bendix, Oliver; Fleischmann, Ragnar; Kottos, Tsampikos; Shapiro, Boris

Short title: Exponentially fragile *PT* symmetry in lattices with localized eigenmodes.

MR Number: 2538823

Primary classification: 81Q12

Secondary classification(s): 81V80 82B44 82D30

Review text:

In a way inspired by quantum mechanics of one-dimensional systems exhibiting the combined parity-reversal plus time-reversal symmetry of their Hamiltonians *as well as* of their wave functions (called, conventionally, an unbroken *PT*-symmetry) the authors re-interpret the corresponding (discrete version of) Schroedinger equation as an (Anderson's) localization problem defined on an optical one-dimensional lattice where the original *PT*-symmetric potential is simply treated as the refraction index. The main result is the demonstration of the fragility of the *PT*-symmetric phase in this model when equipped with a *PT*-symmetric, i.e., peculiar long-range-correlated disorder. This means that the allowed interval of strengths γ of the imaginary part of the random refraction index quickly (viz., exponentially) vanishes with the growth of the lattice size N . Once we return to the original inspiration of the model (viz., to quantum mechanics), this result appears disappointing since the fragility could be considered generic [cf. M. Znojil, Fragile *PT*-symmetry in a solvable model (math-ph/0403033), J. Math. Phys. 45 (2004) 4418 - 4430 where I brought a few more concrete arguments]. Indeed, what has really been found surprising in *some* quantum-mechanical models (cf., e.g., reviews [1] for more details) was an opposite discovery of emergence of non-vanishing and unexpectedly robust *large* domains of admissible, unbroken-*PT*-symmetry-compatible parameters like γ .