This is a review text file submitted electronically to MR.

Reviewer: Znojil, Miloslav

Reviewer number:

Address:
OTF NPI Rez,
250 68 Czech Republic
znojil@ujf.cas.cz

Author: Bender, Carl M.; Jones, Hugh F.

Short title: Quantum counterpart of spontaneously broken classical PT symmetry.

MR Number: 2749106

Primary classification: 34M15

Secondary classification(s): 81Q12; 46C20; 47B50; 34L40

Review text:

Paper "Analytic Continuation of Eigenvalue Problems" by C. M. Bender and A. V. Turbiner [Phys. Lett. Vol. A 173 (1993), p. 442-445] might be cited as one of many half-forgotten proposals of the phenomenologically motivated replacement of the usual real line of coordinates $x \in \mathbb{R}$ (say, in some one-dimensional Schroedinger equation with an analytic potential, say, $(p^2 + (gx)^\alpha)\psi = E\psi$) by a complex contour $\mathcal{S} \subset \mathbb{C}$. The specific choice of the left-right symmetric (often called PT-symmetric) contours $\mathcal{S} \subset \mathbb{C}$ as made in Ref. [1] proved most successful and particularly satisfactory by giving, unexpectedly, the strictly real bound-state-like spectrum for $g = i$ (imaginary unit) and, in the case of an "optimal" contour, for *all* $\alpha \geq 2$. In ref. [7], the "less optimal" contours were declared to pose a "quantum-toboggan" problem: "what changes when the cut-complex-plane choice of $\mathcal{S} \subset \mathbb{C}$ is replaced by the general full-Riemann-surface (i.e., multisheeted) choice of $\mathcal{S} \subset \mathcal{R}$?". One of the best existing partial answers (cf. also H. Bíla, Spectra of PT-symmetric Hamiltonians on tobogganic contours, Pramana - J. Phys. 73 (2009), 307 314, or M. Znojil, Topology-controlled spectra of imaginary cubic oscillators in the large-L approach, Phys. Lett. A 374 (2010) 807812) is provided by the presented paper. The characteristic graphical samples of the overall pattern are displayed in Figures 4 and 6 and their very nice classical and semiclassical non-numerical explanation is provided.