This is a review submitted to Mathematical Reviews/MathSciNet.

Reviewer Name: Znojil, M.

Mathematical Reviews/MathSciNet Reviewer Number: 13388

Address:
Theory Group
NPI ASCR
250 68 Řež u Prahy
CZECH REPUBLIC
znojil@ujf.cas.cz

Author: Hammou, Amine B.

Title: Scattering from a discrete quasi-Hermitian delta function potential.

MR Number: MR2925346

Primary classification: 81Q12

Secondary classification(s): 81Q35 81Q80 81S99 81U20

Review text:

In 2008, H. F. Jones [12] reanalyzed the Bender's and Boettcher's idea of refs. [1,2] where, typically, the imaginary cubic Hamiltonian $H = p^2 + ix^3$ [which is manifestly non-Hermitian in the most common and friendly, but physically "false", Hilbert space $\mathcal{H}^{(F)} := L^2(\mathbb{R})$] has been made self-adjoint in a less usual, rather complicated and *ad hoc* reconstructed "standard" physical Hilbert space $\mathcal{H}^{(S)} := \mathcal{H}_{phys}$. Using perturbation-expansion arguments Jones explained the reasons why it is impossible to extend the idea from its original bound-state implementation and context to the scattering dynamical regime. In my own subsequent papers [6,7] one of the possible constructive resolutions of the paradox has been found in a transition to certain slightly non-local, "smeared" non-Hermitian potentials. The Hammou's paper under review takes the advantage of the efficiency of the discretization method as proposed in the latter two papers. The author re-analyzes the Jones' local-interaction-scattering scenario and he reconfirms his conceptual conclusions by non-perturbative means. With the use of a drastically simplified, exactly solvable alternative to the Jones' toy-model interactions he arrives at the same conclusion by which the cost of making the scattering unitary really lies in making the picture of physics [i.e., typically, the probability current (25) containing the "causality-violating" metric (11)] strongly non-local. In other words, in the light of relation (15), any connection between the variable x in potential $V(x)$ of eq. (20) and a physical, measurable coordinate q is lost.