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Review text:

Twenty years ago, a pioneering paper by Caliceti et al (Commun. Math. Phys. 75 (1980) 51) revealed and pointed out that the spectrum of energies stayed real for certain purely imaginary cubic anharmonic one-dimensional oscillators. Ten years later the relevance of this observation in field theory has been noticed by D. Bessis and his colleagues in Saclay. They were trying to find an explanation of the puzzling reality of the spectra generated by several non-Hermitina Hamiltonians H which commuted with the product PT of parity P and time reversal T. Recently, C. Bender (by the way, non-anonymous and, by acknowledgement, very helpful Khare's and Mandal's referee) with several colleagues proposed that in several different phenomenological models the PT symmetry could in principle serve as a certain form of a substitute for the usually postulated Hermiticity of the Hamiltonian. This type of a modification of the current form of quantum mechanics is also studied in the presented paper.

The authors picked up a certain partially or "quasi-exactly" solvable (QES) potential and discovered that its M exactly obtainable (i.e., elementary) normalizable solutions are eigenfunctions of the operator PT if and only if M is odd. In the other words, the PT symmetry of the model is spontaneously broken for even M. From this the authors deduce the conceptual consistency of the Bender's theory: The energies remain real at odd M and form complex conjugate pairs at even M, indeed.