Reviewer: M. Znojil

Theory Group, Nucl. Phys. Institute ASCR, 250 68 Řež, Czech Republic

Authors: Koike, T

Short title:

On perturbation series of anharmonic oscillator in large order

Publication: Ann. Henri Poincare 1 (2000) 193 - 200

Control number: 1 756 294

Primary classification: 81Q15

Secondary classification(s):

Review text:

Separate coefficients of the Rayleigh-Schroedinger perturbation series for energies of anharmonic oscillators may be computed via elementary recurrences. In the early seventies, Banks, Bender and Wu were even able to determine the asymptotic behaviour of these coefficients by their mere numerical interpolation (cf. refs. [2] and [3]). The validity of their formulae has been supported by the leading-term semi-classical analysis. Later on, several more rigorous and mathematically complete proofs have been added, one of them (cf. ref. [5]) within the framework of resurgence theory. The Koike's paper offers and outlines another version of the latter type of proof.

The main innovation lies in a "disentanglement" of the Stokes lines. In the current picture, they connect the doublets of turning points in the complex plane. The related "degeneracy" of integration contours is removed by the author via a slight "anti-clock-wise" rotation. This decisively simplifies the "exact WKB" matching conditions for the appropriate left and right Jost solutions. The spectrum becomes rigorously quantized. As a byproduct, the procedure provides the desired closed integral representation of asymptotics of the energy coefficients.