Unified treatment of the Scarf potentials and the Pöschl-Teller potentials using the Ma-Xu quantization rule

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Abstract

A general class of potentials covering the Pöschl-Teller type and Scarf type is considered. The analytical expression of the energy eigenvalues is established with the help of the exact quantization formula. Then, using appropriates coordinates transformations, the exact spectrums of five well known potentials: Poschl-Teller, Pöschl--Teller I and Pöschl--Teller II, as well as Scarf I and Scarf II , are deduced in a simple way.