

Resonance and antibound states for Pöschl-Teller potentials and supersymmetric partners

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Bound and antibound states and resonances are analyzed for all variations of the Pöschl-Teller potential, i.e., potential well, low and high barriers. It has shown that the Pöschl-Teller well and low barrier potentials have no resonance poles, but an infinite number of simple poles along the imaginary axis corresponding to bound and antibound states. But, for the Pöschl-Teller high barrier potential there are an infinite number of resonance poles and there are no other singularities. The explicit form of their associated Gamow states are found. The ladder operators connecting wave functions for bound and antibound states as well as for resonance states are also constructed. Finally, using wave functions of Gamow and antibound states in the factorization method, some examples of supersymmetric partners of the Pöschl-Teller Hamiltonian are presented.