

Mathematical Physics

Spectral Singularities of Complex Scattering Potentials and Infinite Reflection and Transmission Coefficients at real Energies

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Spectral singularities are spectral points that spoil the completeness of the eigenfunctions of certain non-Hermitian Hamiltonian operators. We identify spectral singularities of complex scattering potentials with the real energies at which the reflection and transmission coefficients tend to infinity, i.e., they correspond to resonances having a zero width. We show that a wave guide modeled using such a potential operates like a resonator at the frequencies of spectral singularities. As a concrete example, we explore the spectral singularities of an imaginary PT-symmetric barrier potential and demonstrate the above resonance phenomenon for a certain electromagnetic wave guide.

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