

Resonance theory for perturbed Hill operator

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We consider the Schrödinger operator $H_y = -y'' + (p+q)y$ with a periodic potential p plus a compactly supported potential q on the real line. The spectrum of H consists of an absolutely continuous part plus a finite number of simple eigenvalues below the spectrum and in each spectral gap g_n , $n \geq 1$. We prove the following results: 1) the distribution of resonances in the disk with large radius is determined, 2) the asymptotics of eigenvalues and antibound states are determined at high energy gaps, 3) if H has infinitely many open gaps in the continuous spectrum, then for any sequence $(\nu_k)_1^\infty$, $\nu_k \in \{0, 2\}$, there exists a compactly supported potential q with $\int_{\mathbb{R}} q dx = 0$ such that H has ν_k eigenvalues and $2 - \nu_k$ antibound states (resonances) in each gap g_n for n large enough.

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