Resonance theory for perturbed Hill operator

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We consider the Schr\"odinger operator $Hy=-y"+(p+q)y$ 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 $\g_n\ne \es, n\ge1$. 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 $(\vk)_1^\iy, \vk_n\in \{0,2\}$, there exists a compactly supported potential q with $\int_\R qdx=0$ such that H has $\vk_n$ eigenvalues and $2-\vk_n$ antibound states (resonances) in each gap $\g_n$ for n large enough.

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