

KAM method and spectral properties of the limit-periodic Schrödinger operator in dimension two

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joint work with Young-Ran Lee

02.02.2011

Abstract

We consider the application of KAM (Kolmogorov-Arnold-Moser) method for spectral investigation of the Schrödinger operator $H = -\Delta + V(x)$ with a limit-periodic potential $V(x)$ in dimension two. We prove that the spectrum of H contains a semiaxis and there is a family of generalized eigenfunctions at every point of this semiaxis with the following properties. First, the eigenfunctions are close to plane waves $e^{i(\vec{k}, \vec{x})}$ at the high energy region. Second, the isoenergetic curves in the space of momenta \vec{k} corresponding to these eigenfunctions have a form of slightly distorted circles with holes (Cantor type structure).