Extended States for Polyharmonic Operators with Quasi-periodic Potentials in Dimension Two.

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We consider a polyharmonic operator $H = (-\Delta)^l + V(x)$ in dimension two with $l \geq 2$, l being an integer, and a quasi-periodic potential $V(x)$. 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 $e^{i\langle k,x\rangle}$ at the high energy region. Second, the isoenergetic curves in the space of momenta k corresponding to these eigenfunctions have a form of slightly distorted circles with holes (Cantor type structure). A new method of multiscale analysis in the momentum space is developed to prove these results.