Some Results in the Spectral Theory of the Schrödinger Type Operators on the Quantum Lattice Γ^d for $d \geq 2$

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Abstract

The following is a study of the spectrum of the Schrödinger type operator, $H = -\Delta + V$, on the structure known as the quantum graph Γ^d, in dimensions 2 and greater, $d \geq 2$. Specifically, the infinite band gap structure which arises from a periodic delta potential isolated to the vertices of $\mathbb{Z}^d$ and the discrete eigenvalues which arise in the gaps of the spectrum when finitely many sufficiently spaced rank 1 perturbations are made to that periodic potential. The core results of this study being the derivation of equations for the asymptotics of the ends of the spectral bands as well as an equation for the number of discrete eigenvalues which appear in the gaps for both 1 perturbation as well as finitely many sufficiently spaced perturbations.

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