

D-S projection methods for discrete Schrodinger operators

LYONELL BOULTON

Universidad Simon Bolivar, Caracas, Venezuela

Let H be the discrete Schrodinger operator $Hu(n) := u(n-1) + u(n+1) + v(n)u(n)$, $u(0) = 0$ acting on $l^2(\mathbf{Z}^+)$ where the potential v is real and $v(n) \rightarrow 0$ as $n \rightarrow \infty$. Let P be the orthogonal projection onto a closed linear subspace $\Lambda \subset l^2(\mathbf{Z}^+)$. In a recent paper E.B. Davies defines the second order spectrum $\text{Spec}_2(H, \Lambda)$ of H relative to Λ as the set of $z \in \mathbf{C}$ such that the restriction to Λ of the operator $P(H-z)^2P$ is not invertible within the space Λ . We study properties of $\text{Spec}_2(H, \Lambda)$ when Λ is large but finite dimensional. Our particular interest is the connection between this set, the spectrum and the “resonances” of H . In our main result we provide sharp bounds in terms of the potential v for the asymptotic behaviour of $\text{Spec}_2(H, \Lambda)$ as Λ increases towards $l^2(\mathbf{Z}^+)$.