

Some properties of differential operators

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ABSTRACT

We consider the Schrodinger operator H with certain potentials either in the space $L^2(\mathbb{R}^d)$ or $l^2(\mathbb{Z}^d)$. Our goal is to study spectral and scattering properties of the operator H with different potentials. The main research relies on : the existence and completeness of wave operators, surface potentials, spectral theory and related topics. We discuss some approaches to the scattering problem for a pair of operators H_0 and H , where H is the perturbed operator and H_0 is the unperturbed operator while the potential V is the perturbation. We study the spectral properties of H with different potentials such as random potentials, sparse potentials, surface potentials, and double-well potentials. The task of perturbation theory is to deduce information about the spectral properties of $H = H_0 + V$