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Inequalities for the Transformation Operators and Applications

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Abstract: Inequalities for the transformation operator kernel $A(x,y)$ in terms of F-function are given, and vice versa. These inequalities are applied to inverse scattering on the half-line. Characterization of the scattering data corresponding to the usual scattering class $L_{1,1}$ of the potentials, to the class of compactly supported potentials, and to the class of square integrable potentials is given. Invertibility of each of the steps in the inversion procedure is proved. The novel points in this paper include: a) inequalities for the transformation operators in terms of the function F, constructed from the scattering data, b) a considerably shorter way to study the inverse scattering problem on the half-axis and to get necessary and sufficient conditions on the scattering data for the potential to belong to some class of potentials, for example, to the class $L_{1,1}$, to itssubclass $L_{1,1}^a$ of potentials vanishing for $x > a$, and for the class of potentials belonging to $L^2(\mathbb{R}_+)$.

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