

L. Golinskii, A. Kheifets, F. Peherstorfer, and P. Yuditskii (Institute for Low Temperature Physics and Engineering, Kharkov, Ukraine; University of Massachusetts, Lowell, MA, USA; Johannes Kepler University, Linz, Austria)

Faddeev-Marchenko scattering for CMV matrices and the Strong Szegő Theorem

Barry Simon proved the existence of the wave operators for the CMV matrices with Szegő class Verblunsky coefficients, and therefore the existence of the scattering function. Generally, there is no hope to restore a CMV matrix when we start from the scattering function, in particular, because it does not contain any information about the (possible) singular measure. Our main point of interest is the solution of the inverse scattering problem (the heart of the Faddeev–Marchenko theory), that is, to give necessary and sufficient conditions on a certain class of CMV matrices such that the restriction of this correspondence (from a matrix to the scattering function) is one to one. In this paper we show that the main questions on inverse scattering can be solved with the help of three important classical results: the Adamyan-Arov-Krein (AAK) Theory, Helson-Szegő's Theorem and the Strong Szegő Limit Theorem. Each of these theorems states the equivalence of certain conditions. Actually, to each theorem we add one more equivalent condition related to the CMV inverse scattering problem.
