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Non-periodic bounded potentials of the Schrödinger operator and solutions of KdV.

We propose a new method of constructing bounded non-vanishing potentials of the one-dimensional Schrödinger operator. The potentials are constructed by considering the closure of the set of reflectionless Bargmann potentials and are described by a non-local Riemann–Hilbert problem, which can be solved numerically. Such potentials have the spectral structure of finite-gap potentials, but are not in general quasi-periodic. From a physical point of view, these potentials allow ballistic transport of wave packets, and hence describe one-dimensional aperiodic conductors. The corresponding solutions of the KdV hierarchy are bounded but non-vanishing at infinity, and become stochastic under time evolution. (Received September 22, 2015)