Action-Angle Maps and Scattering Theory for Some Finite-Dimensional Integrable Systems

I. The Pure Soliton Case

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Abstract. We construct an action-angle transformation for the Calogero-Moser systems with repulsive potentials, and for relativistic generalizations thereof. This map is shown to be closely related to the wave transformations for a large class $\mathscr{C}$ of Hamiltonians, and is shown to have remarkable duality properties. All dynamics in $\mathscr{C}$ lead to the same scattering transformation, which is obtained explicitly and exhibits a soliton structure. An auxiliary result concerns the spectral asymptotics of matrices of the form $M \exp(tD)$ as $t \to \infty$. It pertains to diagonal matrices D whose diagonal elements have pairwise different real parts and to matrices M for which certain principal minors are non-zero.

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