# Multi-component NLS and MKdV models on symmetric spaces and generalized Fourier transforms

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A special class of multicomponent NLS and MKdV equations, related to the symmetric spaces are shown to be integrable through the inverse scattering method (ISM). The corresponding fundamental analytic solutions are constructed, which makes possible reducing the inverse scattering problem to a Riemann-Hilbert problem. We introduce two minimal sets of scattering data $\mathfrak{T}_j$, $j = 1, 2$, which determine uniquely the scattering matrix and the potential $Q$ of the Lax operator. The elements of $\mathfrak{T}_j$ can be viewed as the expansion coefficients of $Q$ over the 'squared solutions' which are natural generalizations of the usual Fourier transform. Thus we demonstrate that the the mapping $\mathfrak{T}_j \to Q$ is a generalization of the Fourier transform, linearizing the corresponding MNLS and MMKdV equations.

Next, we analyze the effects of additional reductions of these NLEE which may lead to new types of MNLS and MMKdV equations. Finally, we apply the generalized Fourier transforms for expressing their hierarchies of symplectic forms in terms of $\mathfrak{T}_j$ in attempt to construct their action-angle variables.