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Interaction of 2 solitons in the square matrix nonlinear Schrodinger equation

In this study, we are dealing with the 2x2 matrix nonlinear Schrodinger equation. We look at potentials corresponding to pure soliton solutions. In this case, the inverse problem reduces to an algebraic system of equations for the eigenfunctions. The solution of this linear system allows us to reconstruct the soliton solution. This construction is obtained as a byproduct of the inverse scattering transform. Each soliton corresponds to assigning a discrete eigenvalue and a complex 2x2 matrix which is called a norming constant. The nature of the soliton solution crucially depends on whether the associated norming constant is rank one or full rank matrix. Our goal is to investigate interaction of solitons. To this aim, we consider two soliton solutions with all possible choices of the corresponding norming constants and compute the long time asymptotic behavior of the solution in the direction of each of the solitons.