

DARK-DARK AND DARK-BRIGHT SOLITON INTERACTIONS IN
THE TWO-COMPONENT DEFOCUSING NONLINEAR
SCHRÖDINGER EQUATION

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The subject of our investigation is the 2-component nonlinear Schrödinger equation in the normal dispersion regime (defocusing VNLS). Our research builds upon previous results [1, 2] where the Inverse Scattering Transform (IST) was developed to solve the initial value problem for VNLS under non-vanishing boundary conditions. We use the IST machinery to construct multi-soliton solutions to the equation. Such solutions include dark-dark solitons, which have dark solitonic behavior in both components, as well as dark-bright soliton solutions, which have one dark and one bright component. In particular, we present the explicit expressions of one and two soliton solutions for all possible cases: two dark-dark solitons, two dark-bright solitons, and one dark-dark and one dark-bright soliton. We then compute the long-time asymptotic behavior of these solutions before and after any interactions and obtain the phase shifts associated to the interactions.

References

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- [2] B. Prinari, G. Biondini and A.D. Trubatch, “*Inverse scattering transform for the multicomponent nonlinear Schrödinger equation with nonzero boundary conditions at infinity*”, Stud. Appl. Math. 126 (3), pp. 245-302 (2011).