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Quantum nonlinear Schrödinger equation. II. Explicit solution. (English) Zbl 0692.35089
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[For Part I see *Ann. Inst. Henri Poincaré, Anal. Nonlinéaire* 3, 285- 314 (1986; [Zbl 0614.35086](#)).]

This is the second in a series of papers on the nonlinear Schrödinger equation (NLS)

$$\sqrt{-1}\psi_t = -\psi_{xx} + 2c\psi^+\phi^2,$$

an evolution equation on the time-dependent “annihilation operators” $\psi(x,t)$ on the Fock spaces $\hat{\mathcal{R}} = \bigoplus_{N=0}^{\infty} \mathcal{H}_N$. Explicit formulas for the solution of the NLS in terms of “collision expansions” are obtained. The approach is based on the method of intertwining operators for the Hamiltonian \hat{H} on $\hat{\mathcal{H}}$ which is formally given in terms of the creation and annihilation operators ψ^+ , ψ by

$$\hat{H} = \int_{-\infty}^{\infty} dx [-\psi^+ \psi_{xx} + c\psi^+ \psi^2].$$

Reviewer: [J.Weidmann](#)

MSC:

- [35Q99](#) Partial differential equations of mathematical physics and other areas of application Cited in 2 Documents
- [35K55](#) Nonlinear parabolic equations
- [35C05](#) Solutions to PDEs in closed form
- [81T99](#) Quantum field theory; related classical field theories

Keywords:

nonlinear Schrödinger equation; Fock spaces; collision expansions; creation and annihilation operators

Full Text: [DOI](#)

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