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Global well-posedness for the Schrödinger equation coupled to a nonlinear oscillator. (English) [Zbl 1125.35092](#)

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Summary: The Schrödinger equation with the nonlinearity concentrated at a single point

$$i\dot{\psi}(x, t) = -\psi''(x, t) - \delta(x)F(\psi(0, t)), \quad x \in \mathbb{R},$$

proves to be an interesting and important model for the analysis of long-time behavior of solutions, including asymptotic stability of solitary waves and properties of weak global attractors. In this note, we prove global well-posedness of this system in the energy space H^1 .

MSC:

- 35Q40** PDEs in connection with quantum mechanics
- 35B30** Dependence of solutions to PDEs on initial and/or boundary data and/or on parameters of PDEs
- 37K05** Hamiltonian structures, symmetries, variational principles, conservation laws (MSC2010)
- 37L30** Attractors and their dimensions, Lyapunov exponents for infinite-dimensional dissipative dynamical systems
- 81Q05** Closed and approximate solutions to the Schrödinger, Dirac, Klein-Gordon and other equations of quantum mechanics

Cited in **5** Documents

Keywords:

local well-posedness; global well-posedness; asymptotic stability of solitary waves; weak global attractors

Full Text: [DOI](#) [arXiv](#)

References:

- [1] V. S. Buslaev, A. I. Komech, E. A. Kopylova, and D. Stuart, "On Asymptotic Stability of Solitary Waves in a Nonlinear Schrödinger Equation," arXiv math-ph/0702013 (MPI Preprint No. 37/2007, available at http://www.mis.mpg.de/preprints/2005/prepr2007_37.htm).
- [2] A. I. Komech and A. A. Komech, "On Global Attraction to Solitary Waves for the Klein-Gordon Equation Coupled to Nonlinear Oscillator," C. R. Acad. Sci. Paris Ser. I Math. 343, 111–114 (2006). · [Zbl 1096.35020](#) · [doi:10.1016/j.crma.2006.06.009](https://doi.org/10.1016/j.crma.2006.06.009)
- [3] A. I. Komech and A. A. Komech, "On Global Attraction to Quantum Stationary States I. Nonlinear Oscillator Coupled to Massive Scalar Field," Max-Planck Institute for Mathematics in the Sciences, Preprint No. 121/2005, http://www.mis.mpg.de/preprints/2005/prepr2005_121.htm

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