

**Buslaev, V. S.; Komech, A. I.; Kopylova, E. A.; Stuart, D.**  
**On asymptotic stability of solitary waves in Schrödinger equation coupled to nonlinear oscillator.** (English) Zbl 1185.35247  
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The long-time asymptotics is analysed for finite energy solutions of the 1D Schrödinger equation coupled to a nonlinear oscillator. The techniques of Buslaev and Perelman based on the symplectic geometry in Hilbert space and the spectral theory of nonselfadjoint operators are used. For initial states close to a solitary wave, the solution converges to a sum of another solitary wave and dispersive wave which is a solution to the free Schrödinger equation.

Reviewer: Igor Andrianov (Köln)

**MSC:**

[35Q55](#) NLS equations (nonlinear Schrödinger equations)  
[35Q51](#) Soliton equations  
[35B35](#) Stability in context of PDEs  
[35B40](#) Asymptotic behavior of solutions to PDEs  
[37K40](#) Soliton theory, asymptotic behavior of solutions of infinite-dimensional Hamiltonian systems

Cited in **26** Documents

**Keywords:**

Schrödinger equation; nonlinear oscillator; solitary wave; asymptotic stability

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

**References:**

- [1] Berestycki H., *Arch. Rat. Mech. and Anal.* 82 (4) pp 313– (1983)
- [2] Buslaev V. S., *St. Petersburg Math. J.* 4 pp 1111– (1993)
- [3] Buslaev V. S., *Amer. Math. Soc. Trans.* 164 (2) pp 75– (1995) · doi:10.1090/trans2/164/04
- [4] Buslaev V. S., *Ann. Inst. Henri Poincaré, Anal. Non Linéaire* 20 (3) pp 419– (2003) · Zbl 1028.35139 · doi:10.1016/S0294-1449(02)00018-5
- [5] Cuccagna S., *Rev. Math. Phys.* 15 pp 877– (2003) · Zbl 1084.35089 · doi:10.1142/S0129055X03001849
- [6] Deift P. A., *Important Developments in Soliton Theory* pp 181– (1993) · doi:10.1007/978-3-642-58045-1\_10
- [7] Faddeev L. D., *Hamiltonian Methods in the Theory of Solitons* (1987) · Zbl 1111.37001 · doi:10.1007/978-3-540-69969-9
- [8] Grillakis M., *J. Func. Anal.* 74 (1) pp 160– (1987) · Zbl 0656.35122 · doi:10.1016/0022-1236(87)90044-9
- [9] Imaikin V., *Comm. Math. Phys.* 268 (2) pp 321– (2006) · Zbl 1127.35054 · doi:10.1007/s00220-006-0088-z
- [10] Jensen A., *Duke Math. J.* 46 pp 583– (1979) · Zbl 0448.35080 · doi:10.1215/S0012-7094-79-04631-3
- [11] Kirr E., *Comm. Math. Phys.* 272 (2) pp 443– (2007) · Zbl 1194.35416 · doi:10.1007/s00220-007-0233-3
- [12] Komech A. I., *C. R. Math. Acad. Sci. Paris* 343 (2) pp 111– (2006) · Zbl 1096.35020 · doi:10.1016/j.crma.2006.06.009
- [13] Komech A. I., *Arch. Rat. Mech. Anal.* 185 pp 105– (2007) · Zbl 1131.35003 · doi:10.1007/s00205-006-0039-z
- [14] Komech A. I., *Russ. J. Math. Phys.* 14 (2) pp 164– (2007) · Zbl 1125.35092 · doi:10.1134/S1061920807020057
- [15] Miller J., *Comm. Pure Appl. Math.* 49 (4) pp 399– (1996) · Zbl 0854.35102 · doi:10.1002/(SICI)1097-0312(199604)49:4<399::AID-CPA4>3.0.CO;2-7
- [16] Pego R. L., *Phys. Lett. A* 162 pp 263– (1992) · doi:10.1016/0375-9601(92)90444-Q
- [17] Pego R. L., *Commun. Math. Phys.* 164 pp 305– (1994) · Zbl 0805.35117 · doi:10.1007/BF02101705
- [18] Pillet C. A., *J. Differ. Equations* 141 (2) pp 310– (1997) · Zbl 0890.35016 · doi:10.1006/jdeq.1997.3345
- [19] Riesz F., *Functional Analysis* (1990)
- [20] Rodnianski I., *Commun. Pure Appl. Math.* 58 (2) pp 149– (2005) · Zbl 1130.81053 · doi:10.1002/cpa.20066
- [21] Schrödinger E., *Ann. d. Phys.* 81 pp 109– (1926) · Zbl 52.0966.03 · doi:10.1002/andp.19263861802

- [22] Soffer A., *Comm. Math. Phys.* 133 pp 119– (1990) · [Zbl 0721.35082](#) · [doi:10.1007/BF02096557](#)
- [23] Soffer A., *J. Differential Equations* 98 (2) pp 376– (1992) · [Zbl 0795.35073](#) · [doi:10.1016/0022-0396\(92\)90098-8](#)
- [24] Soffer A., *Invent. Math.* 136 pp 9– (1999) · [Zbl 0910.35107](#) · [doi:10.1007/s002220050303](#)
- [25] Soffer A., *Rev. Math. Phys.* 16 (8) pp 977– (2004) · [Zbl 1111.81313](#) · [doi:10.1142/S0129055X04002175](#)
- [26] Stuart D. M. A., *Journal de Mathematiques Pures et Appliqu'ees* 80 (1) pp 51– (2001) · [Zbl 1158.35389](#) · [doi:10.1016/S0021-7824\(00\)01189-2](#)
- [27] Tsai T.-P., *Commun. Pure Appl. Math.* 55 (2) pp 153– (2002) · [Zbl 1031.35137](#) · [doi:10.1002/cpa.3012](#)
- [28] Zygmund A., *Trigonometric Series I* (1978) · [Zbl 0628.42001](#)

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