

**Grébert, B.; Kappeler, T.**

**Perturbations of the defocusing nonlinear Schrödinger equation.** (English) Zbl 1048.37067  
*Milan J. Math.* 71, 141-174 (2003).

The authors study the KAM theory for the defocusing nonlinear Schrödinger (NLS) equation

$$i\partial_t\varphi = -\partial_x^2\varphi + 2|\varphi|^2\varphi, \quad \varphi(x+1, t) = \varphi(x, t), \quad x, t \in \mathbb{R}.$$

The basic theorem says that many of the NLS-invariant tori (not necessarily close to the zero solution) persist and remain linearly stable under small perturbations of the Hamiltonian satisfying three natural conditions. Main technical tool is a detailed treatment of the frequencies  $\omega_k$ . In particular, new closed formulas for  $\omega_k$  are provided which are of independent interest.

The purpose of the present paper is to document that some results and methods from *T. Kappeler* and *J. Pöschel* [KdV & KAM, Berlin: Springer (2003; [Zbl 1032.37001](#))] can applied to the NLS equation, too.

The main results of the paper were previously announced by the authors in [J. Nonlinear Math. Phys. 8, Suppl., 133–138 (2001; [Zbl 0977.35133](#))].

Reviewer: [Iliya D. Iliev](#) (Sofia)

**MSC:**

[37K55](#) Perturbations, KAM theory for infinite-dimensional Hamiltonian and Lagrangian systems Cited in 5 Documents

[35Q55](#) NLS equations (nonlinear Schrödinger equations)

**Keywords:**

KAM theory; persistence of invariant tori; nonlinear Schrödinger equation; small perturbations

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