Statistical Approach of Modulational Instability in the Class of derivative NLS Equations

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The modulational instability (MI) in the class of derivative NLS equations is discussed using a statistical approach (SAMI) [1]-[3]. A kinetic equation for the two-point correlation function is studied in a linear approximation, and an integral stability equation is found. The modulational instability is associated with a positive imaginary part of the frequency. The integral equation is solved for different types of initial distributions (δ-function, Lorentzian) and the results are compared with those obtained using a deterministic approach (DAMI). The differences between MI of the normal NLS equation and derivative NLS equations is emphasized. In the SAMI instead of the k-dependence the instability region is now dependent on the correlation length in the initial 2-point correlation function. Although we got explicit results only for a δ- and Lorentzian distribution function we conclude that the MI is possible only for long-range correlations in the initial state.

References

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