



# Peculiarities of Wave Fields in Nonlocal Media

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**Abstract:** The paper summarizes the studies of wave fields in structured non-equilibrium media described by means of nonlocal hydrodynamic models. Due to the symmetry properties of models, we derived the invariant wave solutions satisfying autonomous dynamical systems. Using the methods of numerical and qualitative analysis, we have shown that these systems possess periodic, multiperiodic, quasiperiodic, chaotic, and soliton-like solutions. Bifurcation phenomena caused by the variation of nonlinearity and nonlocality degree are investigated as well.

**Keywords:** *nonlocal models of structured media; travelling wave solutions; chaotic attractor; homoclinic curve; invariant tori.*

**Mathematics Subject Classification (2010):** 74D10, 74D30, 37G20, 34A45.

## 1 Introduction

Open thermodynamic systems attract attention of scientists by their synergetic properties, their ability to produce localized nontrivial structures and order. Description of such phenomena requires the creation of new and the refinement of already known mathematical models.

According to [1–3], with the methods of non-equilibrium thermodynamics and the internal variables concept [6], the nonlinear temporally and spatially nonlocal mathematical models have been constructed for non-equilibrium processes in media with structure. In

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