Abstract Submitted
for the DFD11 Meeting of
The American Physical Society

Modulation instability of space-periodic oscillatory patterns ALEXANDER NEPOMNYASHCHY, Technion – Israel Institute of Technology, SERGEY SHKLYAEV, University of Puerto Rico, ALEXANDER ORON, Technion – Israel Institute of Technology — Pattern selection and stability of regular (periodic in space) regimes is a classical problem with a number of applications in fluid dynamics. For steady bifurcations both competition of perfect periodic patterns and their stability with respect to slow modulations in space (e.g. Eckhaus or zigzag instabilities) are well studied. In contrast, in the case of Hopf bifurcation, usually only selection of patterns that possess a certain symmetry was analyzed (Silber & Knobloch, Nonlinearity, 1991; Roberts et al, Contemp. Math, 1986), whereas the set of Ginzburg-Landau equations was studied only in the one-dimensional case (rolls). Dealing with a wide class of problems, where the longwave oscillatory instability takes place, we consider a stability of regular oscillatory patterns that belong to either square or hexagonal lattices with respect to spatial modulations. By means of the multiple scale expansion, we derive instability criteria valid near the stability threshold. Useful classification of possible perturbations of a regular structure is introduced. As an example, the theory is applied to Marangoni convection in a layer of a binary mixture with the Soret effect. Domains of stability of space-periodic patterns are obtained.

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Date submitted: 01 Aug 2011 Electronic form version 1.4