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Secondary instabilities of transverse patterns in a coherent microcavity polariton fluid M.H. LUK, Department of Physics, University of Arizona, C.Y. TSANG, Department of Physics, Chinese University of Hong Kong, P. LEWANDOWSKI, Physics Department, University of Paderborn , Y.C. TSE, Department of Physics, Chinese University of Hong Kong, N.H. KWONG, College of Optical Science, University of Arizona, A. LUECKE, Physics Department, University of Paderborn, P.T. LEUNG, Department of Physics, Chinese University of Hong Kong, R. BINDER, College of Optical Science, University of Arizona, S. SCHUMACHER, Physics Department, University of Paderborn — Formation of Turing patterns in interacting coherent polariton fluids has recently been studied theoretically and demonstrated experimentally in semiconductor quantum well microcavities. These patterns originate from modulational instabilities driven by inter-polariton scatterings, leading to translational and rotational symmetry breakings in the laser-pumped polariton field. Competitions among hexagonal and stripe patterns under various conditions have been studied. However, further investigations show that under certain conditions, these simple patterns may be transient and, over time, could undergo secondary instabilities, collapsing or evolving into more complicated states. We will discuss these secondary instabilities of hexagonal and stripe patterns using linear stability analysis and numerical simulations. Furthermore we will discuss optical feedback/filter schemes to stabilize some naturally unstable patterns.

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