Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Dynamic effects induced by renormalization in anisotropic pattern forming systems MATTEO NICOLI, Physique de la Matière Condensée, École Polytechnique, CNRS, Palaiseau, France, ADRIAN KELLER, STEFAN FACSKO, Institute of Ion Beam Physics and Materials Research, Helmholtz-Zentrum Dresden-Rossendorf, Dresden, Germany, RODOLFO CUERNO, Departamento de Matemáticas and Grupo Interdisciplinar de Sistemas Complejos, Universidad Carlos III de Madrid, Leganés, Spain — The dynamics of patterns in large two-dimensional domains remains a challenge in nonequilibrium phenomena. Often it is addressed through mild extensions of one-dimensional equations. We show that full two-dimensional generalizations of the latter can lead to unexpected dynamic behavior. As an example we consider the anisotropic Kuramoto-Sivashinsky equation, which is a generic model of anisotropic pattern forming systems and has been derived in different instances of thin film dynamics. A rotation of a ripple pattern by 90° occurs in the system evolution when nonlinearities are strongly suppressed along one direction. This effect originates in nonlinear parameter renormalization at different rates in the two system dimensions, showing a dynamic interplay between scale invariance and wavelength selection. Potential experimental realizations of this phenomenon are identified. A. Keller, M. Nicoli, S. Facsko, and R. Cuerno, Phys. Rev. E 84, 015202(R) (2011).

Matteo Nicoli
Physique de la Matière Condensée, École Polytechnique,
CNRS, Palaiseau, France

Date submitted: 08 Nov 2011 Electronic form version 1.4