
The discrete Swift-Hohenberg equation

Rudy Kusdiantara^{*†1} and Hadi Susanto^{‡1}

¹Department of Mathematical Sciences, University of Essex – Wivenhoe Park, Colchester CO4 3SQ,
United Kingdom

Abstract

We investigate the discretization effect on the bifurcation behavior of the Swift-Hohenberg equation with cubic and quintic nonlinearity. The discrete Swift-Hohenberg equation is obtained by discretizing the spatial derivatives using a center finite difference. This introduces the discretization parameter h . There are regions of the parameter wherein the discrete Swift-Hohenberg equation behaves either similarly or differently from the continuous version. When $1 \leq h \leq 2$, multiple Maxwell points can occur for the periodic solutions and may cause irregular snaking and isolas. The offset stability of the uniform solution and the pinning region are shifting for large discretization $h > 2$. Numerical continuation is used to obtain and analyze localized and periodic solutions for each case.

*Speaker

†Corresponding author: rkusdi@essex.ac.uk

‡Corresponding author: hsusanto@essex.ac.uk