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The Nikolaevskiy equation with dispersion

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The Nikolaevskiy equation was originally proposed as a model for seismic waves and is also a model for a wide variety of systems incorporating a neutral, Goldstone mode, including electroconvection and reaction-diffusion systems. It is known to exhibit chaotic dynamics at the onset of pattern formation, at least when the dispersive terms in the equation are suppressed, as is commonly the practice in previous analyses. In this paper, the effects of reinstating the dispersive terms are examined. It is shown that such terms can stabilise some of the spatially periodic traveling waves; this allows us to study the loss of stability and transition to chaos of the waves. The secondary stability diagram (Busse balloon) for the traveling waves can be remarkably complicated.

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