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An Analysis of Amplitude Instability for Reaction-Diffusion Systems with Time-Dependent Diffusivities

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A broad class of two-component one dimensional reaction-diffusion systems of the type usually found in Ecology is analyzed in order to establish the qualitative behaviour of solutions. Inspired by the pioneering work of Turing, it is shown that when diffusivities are taken in the form $D_i(t) = d_i + b_i cos(\omega_i t + \varphi)$, relationships can be derived from which instability can be assessed depending on the particular reaction kinetics. The analysis makes use of the Floquet theory, and the final result depends on an a-priori unknown function. Therefore numerical simulations for several different kinetics are presented, showing the essential features of the amplitude instabilities.

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