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Population dynamics and non-Hermitian localization. (English) Zbl 0958.92025

Reguera, David (ed.) et al., Statistical mechanics of biocomplexity. Proceedings of the XV Sitges conference, Sitges, Barcelona, Spain, June 8-12, 1998. Berlin: Springer. Lect. Notes Phys. 527, 124-151 (1999).

Summary: We review localization with non-Hermitian time evolution as applied to simple models of population biology with spatially varying growth profiles and convection. Convection leads to a constant imaginary vector potential in the Schrödinger-like operator which appears in linearized growth models. We illustrate the basic ideas by reviewing how convection affects the evolution of a population influenced by a simple square well growth profile.

Results from discrete lattice growth models in both one and two dimensions are presented. A set of similarity transformations which lead to exact results for the spectrum and winding numbers of eigenfunctions for random growth rates in one dimension is described in detail. We discuss the influence of boundary conditions, and argue that periodic boundary conditions lead to results which are in fact typical of a broad class of growth problems with convection.

For the entire collection see [\[Zbl 0930.00086\]](#).

MSC:

[92D25](#) Population dynamics (general)

[35Q92](#) PDEs in connection with biology, chemistry and other natural sciences

[35K55](#) Nonlinear parabolic equations

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Keywords:

[lattice model](#); [pseudo spectra](#); [sensitivity to boundary conditions](#); [review](#); [localization](#); [non-Hermitian time evolution](#)