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Numerical analysis for structured population models

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Population dynamics can be described by taking into account individuals traits, e.g., age, size and spatial movement [3, 4]. These models, to which we refer as structured population models, are often formulated as (integro-)partial differential equations with nonlocal boundary conditions. From the dynamical system point of view, as a result, their evolution is considered on abstract spaces. In order to assess local stability of equilibria or other invariants, one is typically led to investigate the spectrum of linear operators acting between infinite-dimensional vector spaces, a target that can rather be achieved analytically. In this talk I will present a general numerical approach based on collocation for approximating those spectra in the case of two (physiological or spatial) structures. Convergence has been rigorously investigated for some important problems, numerical tests confirm the general validity of the approach and applications are provided [1, 2].

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