INVITATION TO THE
DOCTORAL SEMINAR

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"Bifurcations in Periodic IDEs"

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Abstract

In theoretical ecology, one often models population growth with the help of discrete-time difference equations. One method to account for the effects of dispersal throughout the habitat is to employ *integrodifference equations*, or IDEs, as opposed to employing scalar difference equations. Given a compact habitat $\Omega \subset \mathbb{R}^d$, usually with $d = 1, 2, 3$, together with some appropriate parameter space Λ, we consider IDEs on the form

$$u_{t+1} := \int_\Omega f_t(\cdot, y, u_t(y), \alpha) dy \tag{1}$$

where for all $t \in \mathbb{N}$, we have $u_t \in C(\Omega)$ and $f_t : \Omega \times \Omega \times \mathbb{R} \times \Lambda \to \mathbb{R}$ is some appropriate function; a commonly employed form for such f_t is e.g. $f_t(x, y, z, \alpha) := k_t(x, y) g_t(y, z, \alpha)$, where k_t is some probability distribution (e.g. Laplace, Gaussian) and g_t is some parameter-dependent growth function (e.g. Beverton-Holt, Ricker).

One is frequently interested in the stability behaviour of *fixed points*, solutions u^* of (1). However, certain IDEs, in particular those using the Ricker growth function, may feature transfer of stability from a branch of fixed

points to a branch of two- (or higher) *periodic orbits*, solutions of the *iterated equation*. We explore such *flip bifurcations*, as well as necessary and sufficient conditions for these, and suggest a simple scheme for numerically locating them.

Barbara Kaltenbacher and the Department of Mathematics look forward to seeing you at the talk!