On the dynamics of the Yoccoz-Birkeland model for the Microtus Epiroticus

We study the discretized version of the dynamical system given by

\[ N(t) = \int_{A_0}^{A_1} N(t-a) \, m(N(t-a)) \, m_\rho(t-a) \, S(a) \, da \]

where the initial condition \( N(t), t \in [-A_1, 0] \), is a continuous function and \( m(N), m_\rho(t), S(a) \) are parameter functions that determine the evolution law. The system has been proposed by Yoccoz and Birkeland to describe the evolution of the population of Microtus Epiroticus (sibling vole) on Svalbard Isles. We prove that, for certain values of the parameters, the system is topologically mixing, which explains some of the high oscillations observed in Nature.