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Travelling wave solutions for integro-differential equations from population dynamics

Our talk concerns some classes of integro-differential equations from population dynamics, where the integral term describes the nonlocal consumption of resources. Both monostable case and bistable case are investigated. Fredholm property of the corresponding linear operators can help to prove the existence of travelling wave solutions. For some models, we can prove the existence of traveling waves only when the support of the integral is sufficiently small. In this case, the integro-differential operator is close to the differential one. One uses a perturbation method which combines the Fredholm property of the linearized operators and the implicit function theorem. For large support, numerical simulations show the propagation of periodic travelling waves. For some other models, Leray-Schauder method can be applied. This implies the construction of a topological degree for the corresponding operators and the establishment of a priori estimates for the solution. Some biological interpretations follow from this study.