# Interactions between segregation and spatial adaptation in a population dynamics problem

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In *Spatial segregation of interacting species*, J. Theor. Biol. (1979), Sighesada, Kawasaki and Teramoto introduced a system of partial differential equations modeling the evolution of spatial spread and segregation of different but similar populations. Apart from competitive Lotka-Volterra (reaction) and population pressure (cross-diffusion) terms, a convective term modeling the populations attraction to more favorable environmental regions was included. In their work, the convective term was assumed to be linear and determined by a given environmental potential. In this article we introduce a nonlinear and non-local dependence in the convective term which allows us to model spatial adaptation by means of a memory mechanism which strengthen the attraction of a population to a point if the population density in such point has been high in the past. In our contribution, after describing the mathematical problem we briefly discuss its well-possedness and propose a numerical discretization in terms of a mass-preserving time semi-implicit finite differences scheme. We also provide the results of biologically inspired numerical experiments showing qualitative differences between the original model of Sighesada et al. and the model proposed in this article.

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