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Mathematical analysis and numerical simulations of a generic population dynamics model

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Abstract :

We consider a two-state semilinear population dynamics model of reaction-transport type. The reaction term exhibits a quadratic nonlinearity involving a kernel operator on the state of the system, whose expression leads to different classical population dynamics models. We first prove the well-posedness of the problem by a spectral method. Then, using the characteristics of the system, we prove that the state of the system is an operator fixed point and use this to perform simulations.