FINITE VOLUME DISCRETIZATION FOR A REACTION DIFFUSION SYSTEM MODELLING AN INDIRECTLY TRANSMITTED DISEASE

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Abstract. This work is concerned with a model of the indirect transmission of an epidemic disease between two spatially distributed host populations having non-coincident spatial domains with nonlocal and cross-diffusion, the epidemic disease transmission occurring through a contaminated environment. The mobility of each class is assumed to be influenced by the gradient of the other classes. We address the questions of existence of weak solutions by using a regularization method. Moreover, we propose a finite volume scheme and proved the well-posedness, nonnegativity and convergence of the discrete solution. The convergence proof is based on deriving a series of a priori estimates and by using a general L^p compactness criterion. Finally, the numerical scheme is illustrated by some examples.

Keywords: Reaction-diffusion system, Nonlocal cross-diffusion, Weak solution, Finite volume scheme.

Mathematics Subject Classifications (2010): 35K57, 35M10, 35A05

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