AFC STABILIZATION METHOD FOR A CROSS-DIFFUSON SYSTEM MODELING A CANCER INVASION

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ABSTRACT

In the this work we investigate a model of invasion of healthy tissue by cancer cells which is described by a system of nonlinear PDEs consists of a cross-diffusion-reaction equation and two additional nonlinear ordinary differential equations. We then show that when the convective part of the system is dominant, the straightforward numerical methods for the studies system is unstable and produces spurious oscillation in the visinity of sharp layers. We present an implicit finite element method using picewise polynomial defined on a rectangular meshes to discretize the model in space. The proposed method is based on algebraic flux-corrected (AFC) transport scheme that guarantees the positivity of the numerical solution. Morover, the Crank-Nicolson method is used to discretize in time and the nonlinear terms in the system are treated with fixed-point iteration in the finite element scheme.

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