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Numerical analysis of tumor model in steady state. (English) Zbl 1121.92036
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Summary: We study the numerical approximation of the steady state tumor model proposed by *M. A. J. Chaplain* and *A. M. Stuart* [*IMA J. Math. Appl. Med. Biol.* 10, No. 3, 149–168 (1993; [Zbl 0783.92019](#))] to describe the angiogenesis process through which new blood vessels are produced. The existence and convergence properties of finite difference approximation solutions are shown. More precisely, we also show that this numerical scheme preserves the structure properties earlier established for the analytical model. Furthermore we actually obtain improvements on the structure conditions given by *W. Allegretto* et al. [*J. Math. Biol.* 35, No. 8, 949–966 (1997; [Zbl 0892.92009](#))]. Some numerical examples are also carried out to demonstrate our theoretical justifications.

MSC:

[92C50](#) Medical applications (general)

[65M06](#) Finite difference methods for initial value and initial-boundary value problems involving PDEs

Keywords:

[maximum principle](#); [finite difference](#); [tumor modeling](#); [nonnegative solution](#)

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