Mikhail Kolev
Warmia and Mazury University of Olsztyn, Poland
e-mail: kolev@matman.uwm.edu.pl
Barbara Zubik-Kowal
Department of Mathematics, Boise State University, USA
e-mail: zubik@math.boisestate.edu

Numerical analysis of a model of tumor invasion

We present a new algorithm for the numerical simulations of a mathematical model proposed by Chaplain and colleagues [1-3] describing tumor invasion and metastasis. The model takes into account the ability of cancer cells to produce and secrete matrix degradative enzymes, which allow the degradation of extracellular matrix, and the invasion of cancer cells due to diffusion and haptotactic migration.

For the numerical simulations of the interactions between the tumor cells and the surrounding tissue, we apply numerical approximations, which are spectrally accurate and based on small amounts of grid-points. Our numerical experiments illustrate the metastatic ability of tumor cells.

References

[1] M.A.J. Chaplain and A.R.A. Anderson, *Mathematical modelling of tissue invasion*, in Cancer modelling and simulation, L. Preziosi, ed., Chapman & Hall/CRC, Boca Raton, FL, 269–297, 2003.

[2] M.A.J. Chaplain, G. Lolas, *Mathematical modelling of cancer cell invasion of tissue: The role of the urokinase plasminogen activation system* Math. Models Methods Appl. Sci. **15** 1685–1734, 2005.

[3] M.A.J. Chaplain, G. Lolas, *Mathematical modelling of cancer invasion of tissue: dynamic heterogeneity* Netw. Heterog. Media **1** 399–439, 2006.