Berlin Mathematics Research Center MATH+

Berlin Mathematical School BMS

MATH+ Friday Colloquium

Friday 27 November 2020 at 14:15

Online (Zoom)

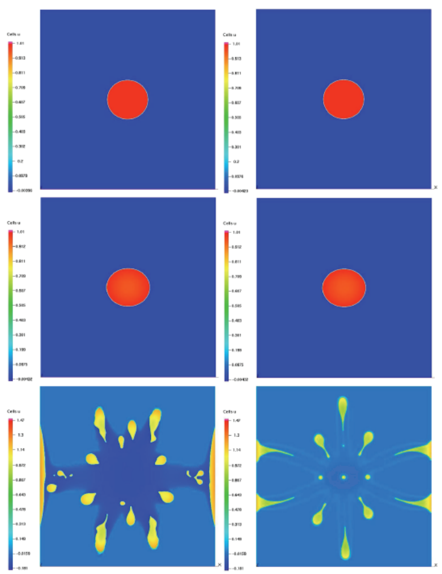

Figure 10. Effects of parameter χ_0: illustrated here are the effects of different values of χ_0 when $\Gamma = 0.045$ and $\epsilon = 0.005$ are held constant. In the first row, $\chi_0 = 0.005$; in the second row, $\chi_0 = 0.05$; and in the third row, $\chi_0 = 0.5$. In the first column, $\delta = 0.1$; and in the second column, $\delta = 0.01$.

Image from Int. J. Numer. Meth. Biomed. Engng. 2012; 28:3–24 DOI: 10.1002/cnm.1467

Elisabetta Rocca

(U Pavia)

Recent topics in the modeling and analysis of diffuse interface tumor growth

This talk addresses recent research on the modeling and analysis of diffuse-interface tumor growth problems. In particular, we consider the well-posedness of two-phase and multi-phase variants of tumor growth described by the evolution of a tumor phase parameter, a nutrient proportion and, in some cases, the velocity field. The variables satisfy the initial boundary-value problem for coupled Cahn–Hilliard, reaction-diffusion and Darcy-type equations. We also discuss related optimal control problems and recent results on the long-time behavior of solutions.

The state system consists of a Cahn-Hilliard type equation for the tumor cell fraction, a reaction-diffusion equation for the nutrient and, in some cases, a Darcy-type law for the evolution of velocities. Medications intended to eliminate tumor cells are is introduced into the system through the nutrient. In this setting, the control variable acts as an external source in the nutrient equation.

Elisabetta Rocca graduated in 1999 from the University of Pavia, where she got her PhD in Mathematics in 2004. She was then a researcher at the University of Milan, when she became an associate professor in 2010. She received an ERC Starting Grant in 2011 and used this to fund her own research group at WIAS in Berlin starting in 2013. She moved to the University of Pavia in 2016, and was promoted to full professor in November 2018. She is the author of more than 90 research papers.