

The phase-field model in tumor growth

R.D.M. Travasso, M. Castro, J.C.R.E. Oliveira

Abstract— Tumor growth is becoming a central problem in biophysics both from its social and medical interest and, more fundamentally, because it is a remarkable example of an emergent complex system. Focusing on the description of the spatial and dynamical features of tumor growth, in this paper we review recent tumor modeling approaches using a technique borrowed from materials science: the phase-field models. These models allow us, with a large degree of generality, to identify the paramount mechanisms causing the uncontrolled growth of tumor cells as well as to propose new guidelines for experimentation both in simulation and in the laboratory. We finish by discussing open directions of research in phase-field modeling of tumor growth to catalyze the interest of physicists and mathematicians in this emergent field.

Index Terms— phase-field; tumor growth; angiogenesis; multiphase model; mixture theory; simulation

Due to copyright restriction we cannot distribute this content on the web. However, clicking on the next link, authors will be able to distribute to you the full version of the paper:

[Request full paper to the authors](#)

If your institution has an electronic subscription to Philosophical Magazine, you can download the paper from the journal website:

[Access to the Journal website](#)

Citation:

Travasso, R.D.M.; Castro, M.; Oliveira, J.C.R.E.; "The phase-field model in tumor growth", Philosophical Magazine, vol.91, no.1, pp.183-206. January, 2011.