

Accepted Manuscript

A convergent numerical scheme for integrodifferential kinetic models of angiogenesis

Luis L. Bonilla, Ana Carpio, Manuel Carretero, Gema Duro, Mihaela Negreanu,
Filippo Terragni

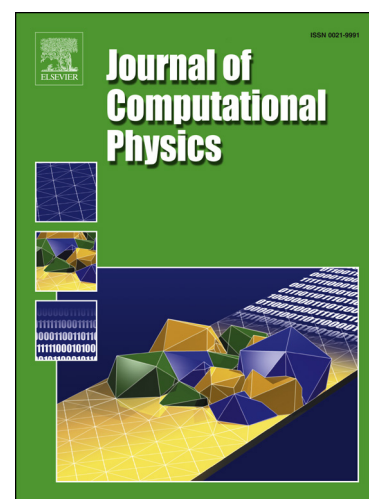
PII: S0021-9991(18)30602-8
DOI: <https://doi.org/10.1016/j.jcp.2018.09.008>
Reference: YJCPH 8255

To appear in: *Journal of Computational Physics*

Received date: 12 December 2017
Revised date: 31 July 2018
Accepted date: 4 September 2018

Please cite this article in press as: L.L. Bonilla et al., A convergent numerical scheme for integrodifferential kinetic models of angiogenesis, *J. Comput. Phys.* (2018), <https://doi.org/10.1016/j.jcp.2018.09.008>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



A convergent numerical scheme for integrodifferential kinetic models of angiogenesis

Luis L. Bonilla

*Gregorio Millán Institute for Fluid Dynamics, Nanoscience and Industrial Mathematics,
Universidad Carlos III de Madrid, 28911 Leganés, Spain*

Ana Carpio¹

*Departamento de Matematica Aplicada, Universidad Complutense, 28040 Madrid, Spain,
tel:+34-91-3944407, fax:+34-91-3944607*

Manuel Carretero

*Gregorio Millán Institute for Fluid Dynamics, Nanoscience and Industrial Mathematics,
Universidad Carlos III de Madrid, 28911 Leganés, Spain*

Gema Duro

*Departamento de Análisis Económico: Economía Cuantitativa, Universidad Autónoma de
Madrid, 28049 Madrid, Spain*

Mihaela Negreanu

Departamento de Matematica Aplicada, Universidad Complutense, 28040 Madrid, Spain

Filippo Terragni

*Gregorio Millán Institute for Fluid Dynamics, Nanoscience and Industrial Mathematics,
Universidad Carlos III de Madrid, 28911 Leganés, Spain*

Abstract

We study a robust finite difference scheme for integrodifferential kinetic systems of Fokker-Planck type modeling tumor driven blood vessel growth. The scheme is of order one and enjoys positivity features. We analyze stability and convergence properties, and show that soliton-like asymptotic solutions are correctly captured. We also find good agreement with the solution of the original stochastic model from which the deterministic kinetic equations are derived working with ensemble averages. A numerical study clarifies the influence of velocity cut-offs on the solutions for exponentially decaying data.

Email addresses: `bonilla@ing.uc3m.es` (Luis L. Bonilla), `carpio@mat.ucm.es` (Ana Carpio), `manili@math.uc3m.es` (Manuel Carretero), `gema.duro@uam.es` (Gema Duro), `negreanu@mat.ucm.es` (Mihaela Negreanu), `fterragn@ing.uc3m.es` (Filippo Terragni)

¹Corresponding author

Download English Version:

<https://daneshyari.com/en/article/11031564>

Download Persian Version:

<https://daneshyari.com/article/11031564>

[Daneshyari.com](https://daneshyari.com)