Congreso de Métodos Numéricos en Ingeniería (CMN2021)
28-30 de junio de 2021, Las Palmas de Gran Canaria, España

NUMERICAL MODELLING OF BIOLOGICAL CELL SYSTEMS

Francisco Javier Montáns Leal[†], José Antonio Sanz*, Josep Sarrate Ramos[+]

[†]Departamento de Aeronaves y Vehículos Espaciales
E.T.S.I. Aeronáutica y del Espacio, Universidad Politécnica de Madrid,
Plaza del Cardenal Cisneros 3, 28040 Madrid, España
Email: fco.montans@upm.es
[*] Departamento de Mecánica de Medios Continuos y Teoría de Estructuras
Escuela Técnica Superior de Ingeniería, Universidad de Sevilla,
Camino descubrimientos, s/n, 41092 Sevilla, España
Email : jsanz@us.es
[+] Departament d'Enginyeria Civil i Ambiental,
ETS d'Enginyeria de Camins Canals i Ports, Universitat Politècnica de Catalunya
Jordi Girona 1-3, Barcelona 08034, España
Email: jose.sarrate@upc.edu

Key words: cells and tissues mechanics, cell polulation dynamics, multiscale and multiphysics models, numerical modeling, data driven simulation.

ABSTRACT

Numerical modeling of cellula systems is one of the most promising tools to understand and predict the behavior of more complex biological structures such as tissues and organs [1-3]. Therefore, unraveling and sorting out the mechanisms underlying cell differentiation, proliferation or migration plays a major role to unravel the processes that transform a group of cells into a functional organism. This involves a close collaboration between experimentalists, biomedical practitioners, physicians, engineers and mathematicians. In this way, new observations in laboratories may feed the development of new theoretical and numerical models. Similarly, mathematical and numerical modeling may impel unforeseen knowledge on cell systems.

The goal of this mini-symposium is to bring together scientists with several backgrounds to discuss and spread their recent developments on biological cell systems through laboratory experiments, mathematical models or numerical simulations.

REFERENCES

[1] H. Kitano, "Computational systems biology". Nature 420, 206-210, 2002
[2] C. Chatelain, P. Ciarletta, B. Martine, "Morphological changes in early melanoma development: influence of nutrients, growth inhibitors and cell-adhesion mechanisms", Journal of theoretical biology, 290, 46-59, 2011
[3] A. Martínez-González, G.F. Calvo, L.A. Pérez Romasanta, V.M Pérez-García, "Hypoxic cell waves around necrotic cores in glioblastoma: a biomathematical model and its therapeutic implications", Bulletin of mathematical biology, 74, 2875-2896, 2012