Mathematical Modeling of the Darwinian Dynamics and the Immune Response to Cancer Evolution

Mohamed CH-CHAOUI[1], Abdelgnani BELLOUQUID[2]
[1] Hassan 1st University, FPK Khouribga, Morocco
mohamed.ch-chaoui@edu.ac.ma
[2] Cadi Ayyad University, Marrakech, Morocco

Keywords: Kinetic theory of active particles; Evolution; Stochastic games; mutations; Multicellular systems

Abstract

In this work, we build upon our previous works in [2, 3] to derive a new mathematical model of the onset and evolution of cancer contrasted by the immune cells, using the approach of the kinetic theory of active particles as detailed in [1]. We present a qualitative analysis of the initial value problem and perform numerical simulations to show how some critical parameters affect the dynamics of the proposed model.

References

[1] N. Bellomo , A. Elaiw , A.M. Althiabi , M.A. Alghamdi, On the interplay between mathematics and biology: Hallmarks toward a new systems biology, Physics of Life Reviews, **12**, 44-64, March (2015).

[2] A. Bellouquid, E. De Angelis and D. Knopoff, From the modeling of the immune hallmarks of cancer to a black swan in biology, *Math. Models Methods Appl. Sci.*, **23** 949–978, (2013).

[3] A. Bellouquid, and M. CH-Chaoui, Asymptotic analysis of a nonlinear integro-differential system modeling the immune response, *Comput Math Appl,* 68, 905-914, (2014).