Nonlinear patterns and waves in biological systems
Special Session A10

Montie S. Avery
Boston University, USA

<u>*Annalisa Iuorio*</u>
Parthenope University of Naples, ITALY

Cinzia Soresina
University of Trento, ITALY

As widely observed in different fields, self-organisation in several fields of applications often leads to the emergence of patterned and travelling wave solutions. A few examples include the formation of spots and travelling vegetation bands in water-limited regions [1,2], the firing patterns of neurons [4], and the emergence of inflammatory aggregates related to immune responses [3]. These relevant phenomena are mostly modelled from the mathematical viewpoint via reaction/advection/cross-diffusion equations. As these models aim to incorporate relevant real-life features, such as complex spatial domains and space/time-dependent parameters, their complexity has steadily increased in the last few years. In turn, an increasing effort of the scientific community has been devoted to advancing the analytical and numerical tools to analyse the emerging solutions and predict their long-time evolution.

The aim of this Special Session is to provide an overview of some of the most recent developments in the investigation of patterned and travelling wave solutions arising in a wide variety of mathematical models. Bringing together experts from the US and the European communities will allow the interactions and the exchange between different techniques and foster new collaborations.

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[2] K. Gowda, H. Riecke, and M. Silber, Transitions between patterned states in vegetation models for semiarid ecosystems, *Physical Review E* 89.2: 022701, 2014.

[3] M.C. Lombardo, R. Barresi, E. Bilotta, F. Gargano, P. Pantano, and M. Sammartino, Demyelination patterns in a mathematical model of multiple sclerosis, *Journal of Mathematical Biology*, 75: 373–417, 2017.

[4] J. Touboul, Propagation of chaos in neural fields, *The Annals of Applied Probability*, 24(3): 1298–1328, 2017.

E–mail: `annalisa.iuorio@uniparthenope.it`.