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ACROSS EPIDEMIC SCALES: MODELLING, NUMERICAL ANALYSIS, FORECASTING AND CONTROL

Constantinos Siettos

School of Applied Mathematics and Physical Sciences,
National Technical University of Athens, Greece

ksiet@mail.ntua.gr

The quest for efficient analysis, forecasting and control of re(emerging) epidemics constitutes one of the most significant and challenging research pursuits of our time. The complex multi-scale interplay of a spectrum of factors imposes a real impediment to our ability to assess the risk of an outbreak and thus to design efficient control strategies. These factors range across multiple scales from the virus micro-scale to the human-vector, human-human interactions up to the social networking as well as to economics and demographics across the globe. Here I will show how we can bridge the dynamics across scales in a strict numerical way, bypassing the need of constructing closures at the level of PDEs and/or ODEs which bias the analysis of the system behaviour [1, 2, 3]. Finally, I will show how the proposed computational framework succeeded in forecasting the dynamics of the Ebola epidemic in West Africa considering control measures, clinical and demographic data [4, 5].

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