Nonlocal discretization of an integral epidemic model including behavioral changes

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It is well known that many significant epidemic models, where the contagiousness is linked to the duration of infection, can be mathematically expressed as nonlinear integral equations [1]. Furthermore, it is well recognized that the spread of an infectious disease may lead to human behavioral changes which, in turn, may produce feedback effects on the epidemic outcomes [3]. In this research, we formulate an integral epidemic model that includes the influence of human behavior on disease progression and study the basic properties of the solutions, the existence of equilibria and their stability [2]. The model is numerically solved through a nonlocal discretization, based on finite differences [4]. This approach is designed to preserve, unconditionally with respect to the stepsize, the main characteristics of the original system, as positivity, boundedness and the stability nature of equilibria. In order to show the effectiveness of the method, we compare our results with the ones obtained by the continuous approach. Finally, we point out how the proposed numerical method is suitable also for long-time simulations.
This work is in collaboration with B. Buonomo and E. Messina (University of Naples Federico II) and A. Vecchio (IAC-CNR, Naples).

References

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