Delayed SIR Epidemic Model with a Saturated Incidence Rate

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In this contribution, we consider a delayed SIR epidemic model in which the susceptibles are assumed to satisfy the logistic equation and the incidence term is of saturated form with the susceptible. We investigate the qualitative behaviour of the model and find the conditions that guarantee the asymptotic stability of corresponding steady states. We present the conditions in the time lag τ in which the DDE model is stable. Hopf bifurcation analysis is also addressed. Numerical simulations are provided in order to illustrate the theoretical results and gain further insight into the behaviour of this system.

Keywords: Delay, Hopf bifurcation, SIR, Stability, Stiff differential equation