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Modeling relapse in infectious diseases

An integro-differential equation is proposed to model a general relapse phenomenon in infectious diseases including herpes. The basic reproduction number \mathcal{R}_0 for the model is identified and the threshold property of \mathcal{R}_0 established. For the case of a constant relapse period (giving a delay-differential equation), this is achieved by conducting a linear stability analysis, and employing the Lyapunov–Razumikhin technique and monotone dynamical systems theory for global results. Numerical simulations, with parameter values relevant for herpes, are presented to complement the theoretical results, and no evidence of oscillatory solutions is found.

Joint work with Xingfu Zou.