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Dynamics of a PDE viral infection model incorporating cell-to-cell transmission

In this talk, I will concern with the global dynamics of a PDE viral infection model with cell-to-cell transmission and spatial heterogeneity. The basic reproduction number \mathcal{R}_0 is obtained in a variational characterization. It is shown that if $\mathcal{R}_0 \leq 1$, then the infection-free steady state is globally asymptotically stable, while if $\mathcal{R}_0 > 1$, then the system is uniformly persistent and the infection steady state is globally asymptotically stable. The proof is based on the construction of the appropriate Lyapunov functionals and usage of the Green's first identity together with the LaSalle's invariance principle. In the case of constant parameters, the basic reproduction number \mathcal{R}_0 is easily calculated and the numerical simulation is performed to verify its threshold property.