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Global Stability for Epidemic Models with Delay

Many ODE models of disease spread have been shown to exhibit the traditional threshold behaviour: *if $R_0 < 1$, then the disease-free equilibrium is globally asymptotically stable (GAS); if $R_0 > 1$, then the endemic equilibrium is GAS*. Recently, there has been good progress on this through the use of a Lyapunov function that Goh first used for ecological models.

Separately, there have been many functional differential equation (FDE) models of disease spread that have used delay to account for vector transmission, or have used integrals to account for infection-age structure. Earlier results on the global dynamics of these models introduce restrictions on the parameters which seem to be an artifact of the method.

I will discuss recent work that uses Goh-type Lyapunov functionals to resolve the global dynamics for some of these FDE models, achieving the traditional threshold result.