Theory of Infectious Disease

Homework 4

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Dynamics of vector-borne disease

Using **R** and **deSolve**, implement a numerical solver of the vector-borne disease model described in Keeling & Rohani Eqs. 4.16. Using the top two panels of Fig. 4.13 as a guide, come up with reasonable values for the model parameters and explore the model's dynamics.

Fast-slow reduction

Next, implement the fast-slow reduction of the model. This is captured in the second pair of displayed differential equations in Box 4.2. Use **R** and **deSolve** to solve these equations, using the same parameters as before. How are the dynamics of the two models related?

Seasonal forcing in SIR dynamics

Use numerical solutions to explore the dynamics of the seasonally-forced SIR model expressed in Eqs. 5.2–5.4. Use Fig. 5.6 as a guide.