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*Some Results On A Diffusive SIR Model*

The model we are interested in is given by

$$\begin{cases} S_t = d_1 S_{xx} + \Lambda - \beta(x)IS - b_1 S, \\ I_t = d_2 I_{xx} + \beta(x)IS - (b_2 + \gamma)I, \quad 0 < x < 1, \ t > 0 \\ R_t = d_3 R_{xx} + \gamma I - b_3 R, \end{cases} \tag{1}$$

with homogeneous Neumann boundary conditions, where $S$, $I$, $R$ denote the number of susceptible, infectious and recovered population, respectively. In this talk, I will present some results on the existence and the structure of global attractor, and the existence of positive steady states. We prove that there exists an threshold parameter $R_0$, whose sign determines the structure of the global attractor. If $R_0 \leq 0$, the disease-free equilibrium $P_0$ is globally stable. If $R_0 > 0$, $P_0$ is unstable, and a positive, $x$-dependent endemic equilibrium $P^*$ exists. In the special case when $\beta(x) = $ constant, $P^*$ is independent of $x$ and is globally stable.

This is a joint work with Michael Y. Li.