Spatial segregation in reaction-diffusion epidemic models

In this talk, I will introduce two SIS reaction-diffusion epidemic models with cognition, and the cognitive diffusion either takes a Fokker-Planck type diffusion obtained by Chapman's diffusion law (called random diffusion) or follows Fick's diffusion law (called symmetric diffusion). We show the impact of movement strategies on disease outbreak and mitigation under a spatially heterogeneous environment. We derive a variational expression of the basic reproduction number and obtain the threshold dynamics for both models which is tested by some simulations. More importantly, it is believed that spatial segregation phenomenon between susceptible and infected populations regulated by different movement strategies is natural, not caused by an isolation policy, and thus is one of the most important indicators for an infectious disease to spread or wane in the absence of intervention. Based on this, we will use three examples to illustrate the segregation phenomenon between susceptible and infected populations regulated by different movement strategies.