DYNAMICS OF MULTI-STAGE EPIDEMICS ON NETWORKS

K.B. Blyuss

Department of Mathematics, University of Sussex,
Falmer, Brighton, BN1 9QH, United Kingdom

k.blyuss@sussex.ac.uk

Many realistic infections are characterised by a non-exponential distribution of their infectious periods, which can be modelled using the formalism of multiple disease stages. Whilst some work has been done previously on homogeneously mixed multi-stage models, the dynamics of such epidemics with account for network effects has not been studied. In this talk I will discuss how ODE-based models can be effectively used to study the dynamics of multi-stage epidemics on networks. I will show how various disease characteristics, such as the probability of transmission across an infected edge, the final epidemic size, and the threshold for epidemic outbreaks, depend on the number of epidemic stages [1]. Extensions to degree-heterogeneous and clustered networks will also be discussed [2]. Numerical results show excellent agreement between pairwise approximation models and direct network simulations.

References

[1] N. Sherborne, K.B. Blyuss, I.Z. Kiss. (2015). *Dynamics of multi-stage infections on networks*, Bull. Math. Biol., 77 (10), 1909–1933.

[2] N. Sherborne, K.B. Blyuss, I.Z. Kiss. (2016). *Compact pairwise models for epidemics with multiple infectious stages on degree heterogeneous and clustered networks*, J. Theor. Biol., 407, 387–400.