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ON BOUNDING EXACT MODELS OF EPIDEMICS ON NETWORKS

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Modelling the spread of epidemics on networks has led to a myriad of mean-filed models such as heterogenous degree-based, pairwise, effective-degree, edge-based compartmental and NIMFA [1, 2]. All these deterministic models aim to approximate the underlying exact stochastic process by taking account or encoding the structure of the network and the properties of the transmission process. Except a few cases [3, 4], mean-filed models are validated heuristically by comparing outputs from these to results based on explicit stochastic network simulations, and comparisons are usually only feasible for a limited number of different networks and parameter combinations. In this talk I will present some rigorous results based on two different techniques.

The first uses comparison theorems from classical ODE theory [5], while the second starts from the forward Kolmogorov equations and manipulates the moments favourably [6, 7, 8] to bound the absolute difference between the prevalence of the exact and mean-field model.

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