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Applications of the graph-theoretic approach to heterogeneous cholera models

The graph-theoretic approach has become a standard method to construct global Lyapunov functions for large-scale differential equation systems. Appropriate graph/network design and reduction is the key in the successful application of the approach. We illustrate these graph/network techniques using various types of cholera models that incorporate heterogenous structures in the host/pathogen (multi-stage or multi-group) and environment (multi-patch or multi-city).