Murad Banaji
University of Portsmouth, UK
e-mail: murad.banaji@port.ac.uk

Monotone dynamics in chemical reaction networks

Proving that the allowed dynamics of certain classes of chemical reaction networks (CRNs) is necessarily simple regardless of the kinetics is both of interest in itself, and potentially provides insight into how more complex dynamics can arise. Here, recent theory on monotone dynamical systems is applied to demonstrate local and global stability of equilibria for a class of CRNs. The stability results arise from the interaction of two structures which occur frequently in CRNs: preservation of a partial order and the existence of constants of motion. The class shown to have strong stability properties is defined via the network structure, with only weak assumptions on the reaction kinetics. The key conditions on the network are (i) that the stoichiometric matrix can be factorised in a certain way, and (ii) that an associated digraph is strongly connected.