

On the mathematical structure of balanced chemical reaction networks

Bayu Jayawardhana (University of Groningen)

June 8, 2012

In this talk, I revisit the analysis of chemical reaction networks described by mass action kinetics. In particular, we derive a compact formulation for such networks with a thermodynamic equilibrium. The framework contains the structure of the complex graph and the stoichiometry of the network, and admits a direct thermodynamical interpretation. This formulation allows us to easily characterize the set of equilibria and their stability properties. Furthermore, we develop a framework for interconnection of chemical reaction networks, and we discuss how the established framework leads to a new approach for model reduction. Further extension of the framework for general kinetics is also presented.