

Passivity-Based Analysis of Large Systems: Examples from Reaction Networks

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This talk presents a simplifying approach to the analysis of large-scale systems based on the concept of passivity, and illustrates it on biochemical reaction networks. The main result determines stability of the network from conditions imposed on a “dissipativity matrix” which incorporates information about the passivity properties of the components, the interconnection structure of the network, and the signs of the feedback terms. This stability test encompasses the classical “secant criterion” for cyclic networks and extends it to general interconnection structures represented by graphs. A further modification is developed to determine stability and synchronization in reaction-diffusion models.
