SEMINÁRIO DE ANÁLISE E EQUAÇÕES DIFERENCIAIS

Dia 28 de Setembro (quinta-feira), às 13h30, sala 6.2.33

Biochemical reaction networks: sense and sensitivity

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Abstract: For general chemical or biological reaction networks, we present a systematic mathematical analysis of the steady state response to perturbations of reaction rates. We make sense of this response in terms of the sensitivity of (experimentally accessible) concentrations and (invisible) reaction fluxes.

Our function-free approach does not require problem-specific numerical input. Based on the stoichiometric structure of the reaction network, only, we explore which steady state concentrations and reaction fluxes are sensitive to a rate change, and which are not. Specifically, we establish a transitivity property for the sensitivity of reaction fluxes. This allows us to summarize all network responses in a single influence graph. The results and concepts are motivated by –- and of experimental relevance to –- specific metabolic networks in biology, including the ubiquitous tricarboxylic citric acid cycle.

This is joint work with Bernhard Brehm (KTH Stockholm). See also `arXiv:1606.00279`.