Dynamic analysis of chemical and biochemical reaction networks

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The objective of this course is to review state of the art theory and methods dedicated to the analysis of chemical and biochemical network dynamics. In particular, emphasis will be put on the role of the network structure and parameters on the class of dynamic behaviour exhibited.

To this end, the framework of CRNT (Chemical Reaction Network Theory) as developed by M. Feinberg and co-workers will be revisited and adapted to set up links with alternative approaches as well as to establish connections with the underlying physical reaction kinetic principles.

The course will comprise 4 lectures:

Monday 22 (10:30-12:30): general motivation in the context of biochemical systems

Monday 22 (14:00-17:00): formal representation of reaction networks and critical discussion of the essential results of CRNT with particular emphasis on the concept of network deficiency

Wednesday 24 (10:30-12:30): effect of parameters on the nature of possible equilibrium points in a geometric context.

Wednesday 24 (14:00-17:00). Numerical methods to compute parameter regions associated to multistability.

Conclusion of the course with a personal view of open problems and perhaps promising solutions.