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Berlin Mathematical School

BMS Women In Mathematics

Lecture Series

Friday, June 17, 2011 at 14:30

Tea and cookies will be served after the lecture.

FU Berlin, SR 007/008, Arnimallee 6, 14195 Berlin

Heike Siebert

(FU Berlin)

Linking Structure and Dynamics of Discrete Regulatory Networks

Discrete dynamical network models have proven to be useful in a variety of applications, such as logistics, social sciences and biological systems. Consequently, efficient analysis methods for structural characteristics and dynamical properties of such models are in high demand. The network structure describes dependencies and character of interactions between components and can be represented by signed digraphs. For discrete models, corresponding network dynamics can also be captured by a directed graph, the so-called state transition graph. Its vertex set is exponential in the number of network components, and its topology can be very complex when dealing with realistic representations of real-world systems, in particular in biological applications. Comprehensive analysis of the state transition graph is no easy task since efficient methods need to avoid explicit calculation of the entire graph.

In her talk, Heike Siebert will give a number of results relating structural and dynamical characteristics of a discrete regulatory network using methods from iteration, Boolean spectral and graph theory. She will show that cycles in the graph representing the network structure are closely linked to attractor characteristics of the system. Such results allow us to focus on the comparably small network structure to obtain information on the system's dynamics without having to generate the state transition graph.

Heike Siebert completed her Ph.D. on „Fixed points and normal families of quasiregular mappings" in 2004 at the Christian-Albrechts-Universität Kiel. Since 2005, she has been working as a research assistant in the group „Mathematics in Life Sciences" of Alexander Bockmayr at the Freie Universität Berlin.

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