DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE UNIVERSITY OF SOUTHERN DENMARK, ODENSE

COMPUTER SCIENCE COLLOQUIUM

Rewriting theory for stochastic dynamical systems and combinatorics

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IMADA's Seminar Room

Abstract:

Based upon certain recently introduced extensions of categorical rewriting theory (associativity theorem and rule algebras), I will present applications of rewriting theories to the analysis of continuous-time Markov chains, notably (organo- and bio-) chemical reaction systems, as well as an example from the social sciences (a variant of the voter model). Crucially, rewriting theory itself serves as the source of a mathematical framework for computing sequential compositions of random transitions, which is embedded into general CTMC theory via the notion of rule algebras and their representations. As a second application of this extended form of rewriting theory, I will report on pattern-counting problems in combinatorics that may be approached via rule-algebraic techniques (work in progress with N. Zeilberger, LIX). Time permitting, I will touch upon the most recent developments in compositional rewriting theory, the notion of so-called tracelets, a formalization of pathways in chemical reaction systems.