INSTITUTUL DE MATEMATICĂ "SIMION STOILOW" AL ACADEMIEI ROMÂNE

Conferința lunară

From Biology to Computer Science and back: Cover automata, P Systems and discrete simulations of apoptotic pathways

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Abstract: This talk will describe some recent results in the automata theory, specifically related to the Deterministic Cover Automata as introduced by Sheng Yu and their applicability for processing Biological data, then a second part of the talk will describe briefly the bio-inspired computing devices called membrane systems. Several recent results in this area will be presented and we will discuss their importance for the biocomputing field. A third part of the talk will focus on using the membrane systems as a framework for simulating signal transduction pathways with a focus on apoptotic pathways. We will give the description for the Nondeterministic Waiting Time (NWT) algorithm, a biochemical modeling approach based on the Membrane Systems. This simulation technique provides a unique perspective on the biochemical evolution of the cell different from both Gillespie's algorithm and also from ODE-based simulations. In the end we describe recent results obtained through this simulation technique to address issues surrounding so-called latent HIV-infected cells, being able to predict the behavior of these rare cells.