

APPLIED MATHEMATICS COLLOQUIUM

Date: Wednesday, April 22, 2015

Time: 2:30 – 3:30 p.m.

Location: Middlesex College Room 204

Equation-Based Modeling: Structural Analysis and Hybrid Systems

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Abstract:

Systems of differential-algebraic equations (DAEs) are routinely generated by modern simulation tools (e.g. MapleSim, Wolfram System Modeler, OpenModelica). Various algorithms are applied in the steps from creating a model to a final mathematically solvable set of equations. Typically, some form of analysis on the structure of the DAE is performed to determine the index and constraints of the problem. This is followed by index reduction for higher-index problems. Many systems are hybrid, meaning that they have discrete equations, typically modeling state-change events, alongside the continuous ones. State-change may change the index or other structural properties, so how to handle a possible multiplicity of states during simulation is an active research topic. This session is devoted to structural analysis methods and symbolic-numeric techniques to obtain insights into the mathematical structure of a model, and the interaction of structural analysis with hybrid systems of DAEs.