



# McGill Computational Science and Engineering Seminar

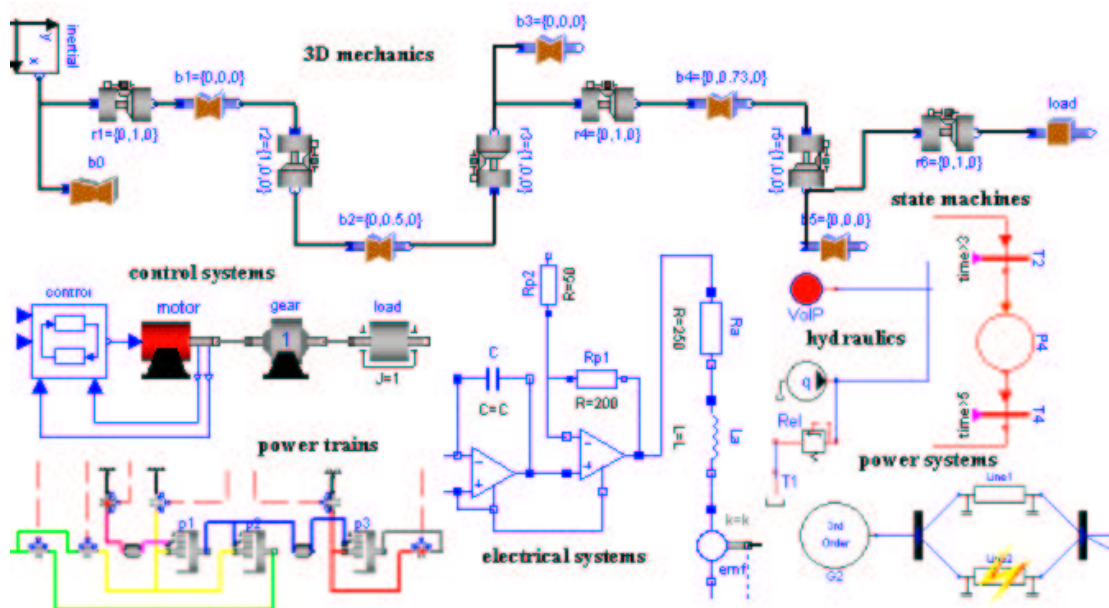


Friday Sept 21 at 14:30 in McConnell Engineering Bldg Room 103

## Object-Oriented Modelling and Simulation of Physical Systems

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For the last two decades, the object-oriented paradigm has become a highly useful means to reason about software systems. Software becomes easier to comprehend, and re-use and exchange of code becomes easier. In particular, inheritance allows for extension and refinement of existing code. It seems reasonable to reason about models of dynamical systems in a similar fashion, to build model (as opposed to code and more specifically class) libraries and re-use and exchange them. Due to the time-component present in models of dynamical systems, extension of software engineering techniques is not always straightforward. Some of these differences will be presented. For example, programming language types will be compared to modelling language types. This will lead to the merits as well as the dangers of using inheritance in models of system behaviour. Above all, in physical systems, unlike in software, the computational causality (what is input and what is output) of components is not a priori determined. Fixing this causality limits model re-use dramatically. The implications of non-causal modelling will be discussed as well as the graph theory techniques used to manipulate non-causal models to still allow efficient numerical solution. Examples using the WEST++ and Modelica systems will be given.



Coffee and desserts are served before the seminar at 14:00 in the lounge, McConnell Engineering Building Room 321.