Substructuring and model order reduction

In structural dynamics, reduced models enable more efficient analyses of complex systems with a large number of degrees of freedom. Many reduction methods use the basic idea of splitting a complex structure into substructures. Each substructure then consists of inner nodes and interface nodes that connect the substructures. Considering the static case, static condensation reduces all degrees of freedom of the inner nodes without loss of accuracy of the obtained solution. Considering the dynamic case, application of static condensation is not possible, but there are several methods in the literature to treat this problem. Among others, two approaches for dynamic substructuring are Craig-Bampton and Guyan reduction.

The aim of the thesis is to study and to explain methods for model order reduction for linear dynamics, to implement selected methods, and compute several illustrative examples.

The specific tasks are

- Study of literature
- Implementation of the methods using Maple/MATLAB/C++ (in NumPro)
- Comparison of results for self chosen examples and interpretation of the results

Recommended fields of interest
dynamics, finite element programming