Technische Universität Braunschweig

INSTITUT FÜR AKUSTIK

Accelerating model order reduction algorithms using GPU

Study Project | Master Thesis

General-purpose computations on a graphics processing unit (GPU) are a promising way to improve the computational performance of numerical algorithms. Parallel computing by utilizing the numerous GPU cores can yield faster results for certain math operations when compared to parallel computing utilizing a few CPU cores.

Model order reduction (MOR) techniques are approximation methods to reduce the high computational burden arising in a numerical simulation. Using a suitable MOR algorithm, the sophisticated model can be reduced to a model with smaller dimensions, which enables faster computations. These MOR algorithms possess several potential mathematical operations, for example numerous dense matrix algebra, capable of being efficiently performed on a GPU. Such a GPU accelerated algorithm supports faster evaluation of accurate reduced-order models in practical applications.

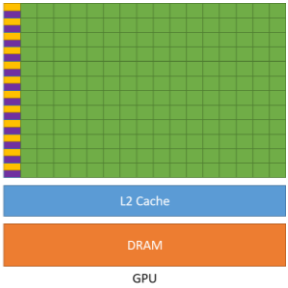
Tasks:

- Understanding basics of Krylov-subspace MOR algorithms
- Identifying and implementing the mathematical kernel functions using CUDA C++/Python

Requirements:

Basic understanding of FEM, parallel computing, C++/python

Begin: March 2022



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