

# Project Specification

**Title (Preliminary):** GPU Simulation of Rigid Fibers

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## Description:

The goal of this master's thesis is to speed up and adapt the simulation method presented in "A Numerical Method for Simulations of Rigid Fiber Suspensions" by Anna-Karin Tornberg and Katarina Gustavsson to run on a Graphics processing unit (GPU). The implementation will be done using NVIDIA GPUs using the Compute Unified Device Architecture (CUDA).

After the initial porting of the simulation further work will be done to optimize and fine-tune the algorithm to take advantage of the highly parallel compute architecture and high bandwidth memory access provided by modern GPUs. The achieved performance improvements will be compared against the original serial CPU implementation using Fortran, especially with regards to the respective ability to scale with the number of simulated rigid fibers.

Towards the end, if time permits, one of a few possible extensions to the algorithm and/or implementation will be looked at. Potential candidates are (1) Visualization, (2) Brownian Motion or (3) Not storing matrix in memory.