Abstract:
In this master project presentation we discuss multiscale models for particle simulations, characterized by prescribing particle motion on microscopic and continuum transport on macroscopic scale.
On the microscopic level, each particle has its own mass, position and velocity, while on macroscopic level the particles are interpolated to a continuum quantity whose evolution satisfies a governing system of transport equations.
This way, one can prescribe various types of interactions on a global scale, whilst still being able to track individual trajectories, as well as maintaining decent simulation speed for a large number of particles.
In addition, particle motion and interaction is well tuned in both regions of low and high densities.
We propose possibilities to prescribe particle transport and interaction both levels.
Finally, we discuss two implementations of such models to simulate crowd dynamics in various situations.
Inhomogeneity is modelled by obstacles and is combined with arbitrary inflow and outflow conditions. We introduce a route planning algorithm to account for the destination-oriented motion.
This creates convincing simulations for pedestrian flow which can be applied to gain insight in evacuation and traffic scenarios.