



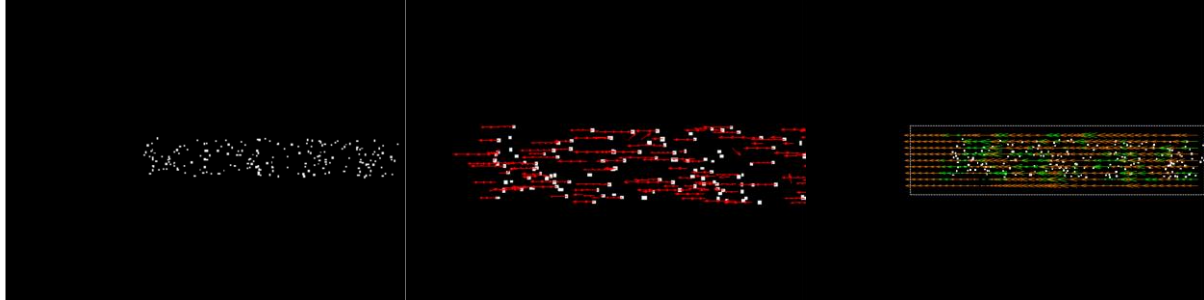
Master's Thesis:

Improvement of relaxation based particle tracking algorithms

Particle Tracking Velocimetry (PTV) methods like the Relaxation Method can be used to calculate the trajectory of particles in fluids based on camera images. The theoretical foundation of PTV is the Lagrange approach, which means the flow properties are determined by tracking the motion of the particles as they move in time. Additionally, local velocity fields can be calculated using Particle Image Velocimetry (PIV) methods, which are based on the Euler approach.

The goal of the thesis is the improvement of relaxation based particle tracking by the integration of PIV-based local velocity. Therefore, existing methods from literature have to be analysed, implemented and compared based on synthetic 2D- and 3D- image sequences. Based on the results, improvements of the algorithms should be suggested and validated.

The thesis can be written in both English and German.



Tasks:

- Literature review focusing on the PTV- and PIV-based algorithms for particle tracking,
- Implementation of PIV-algorithm and calculation of the local velocity field for the synthetic data
- Implementation of Relaxation Method (PTV-algorithm) and calculation of particle trajectories for the synthetic data
- Implementation of the modified Relaxation Method algorithm by integrating PIV
- Analysis of the results from the modified Relaxation Method compared to plain PTV
- Investigation of further improvements of the modified Relaxation Method algorithm
- Documentation of all results

Requirements:

We are looking for a highly self-motivated student in the field of mechanical engineering or related. Knowledge and experiences in MATLAB is a requirement.