

# GPU Multigrid Solver for the Navier-Stokes Equations

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This contribution presents a GPU implementation of a multigrid method for the problem of 2D air flow over a simplified urban canopy governed by the incompressible Navier-Stokes equations. In the first part we present this problem which is discretized by means of the mixed finite element method with semi-implicit time stepping and then the arising linear saddle-point problem which is solved by the geometric multigrid method with the Vanka type smoother.

In the second part the GPU implementation itself and issues that had to be resolved are described. Finally the obtained speed-ups will be shown. We have achieved the speed-up of 5 compared to the parallel code based on OpenMP and 26 compared to the sequential code.