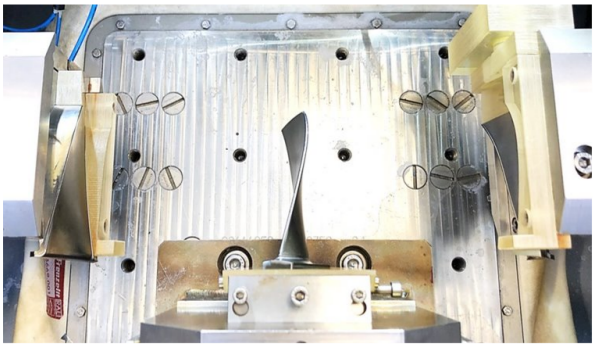
Aerodynamisches Institut und Lehrstuhl für Strömungslehre | RWTH AACHEN UNIVERSITY

Numerical modelling of gas-liquid bubbly flows

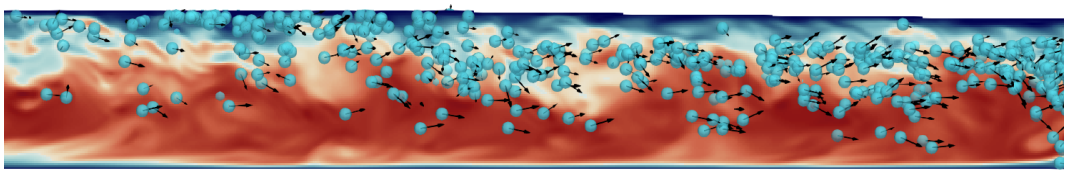
Researching the multiphase flows of the Precise Electrochemical Machining (PECM) process

The Institute of Aerodynamics develops state-of-the-art simulation methods for fluid dynamic problems. These methods are integrated into a powerful, multiphysical simulation environment, optimized to run on high-performance computing (HPC) hardware. For multiphase applications, like gas-liquid bubbly flows, modelling approaches based on the coupling of multiple solver types (e.g. Finite-Volume, lattice Boltzmann or Lagrangian particle tracking) are developed. This regularly leads to thesis oportunities for students of different skill levels.

An application of these methods are simulations of the gas-liquid electrolyte flow, that forms during the PECM process. This manufacturing technique is mainly used in high-tech industries with strict requirements for geometrical accuracy combined with durability requirements in adverse operating environments, experienced e.g. by turbomachinery components. The research focusses on understanding the transport of gas that is formed during the process since it can lead to shape deviations in the finished product. Thus the overarching goal is to simultaniously improve the accuracy of the process and reduce the development time of tool geometries for new workpieces.



Compressor blade in the machining chamber of a PECM machine.



Interaction between gas bubbles and the turbulent flow in the machining channel.

You ...

- ... are interested in numerical modelling of fluid mechanics.
- ... want to work on a state-of-the-art multiphysical simulation framework.
- ... have significant experience in an object-oriented programming language, preferrably C++.

If you are interested, please contact:

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