

MSC graduation assignment

CFD calibration of a flowmeter

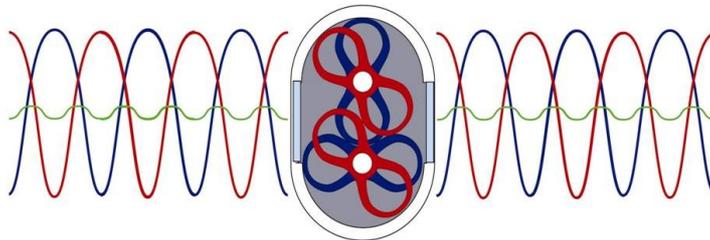
VSL is the National Metrology Institute of the Netherlands, appointed by the Dutch government to maintain and develop the national measurement standards, such as the meter, second and kilogram. As such VSL makes measurement results of companies, laboratories and organizations directly traceable to international standards.



In order to realize traceability to international standards, every device that measures a certain property, e.g. meter per second, needs to be calibrated against the aforementioned international standards. Some flow meters, however, are used in a

certain regime which is very difficult to realize in a laboratory, e.g. high pressure and/ or temperature. CFD, therefore, may be used to calibrate the flowmeter at process conditions which are too difficult or expensive to realize in the lab.

The goal of the assignment is to investigate whether CFD can be used to calibrate a flowmeter (turbine, rotary, and/ or ultrasonic) at certain process conditions. The approach is twofold. First, for process conditions that can be realized in the lab, a flowmeter will be tested and calibrated (at VSL). Thereafter, the results will be reproduced with CFD (at TU), which will probably involve a study into different turbulence models. Second, CFD will be used to simulate the process conditions which cannot be realized in the laboratory in order to calibrate the flowmeter.



All CFD simulations will be carried out with the free and open source package OpenFOAM. Because OpenFOAM does not

have a user interface, the student should not be afraid of some coding. During the assignment the student can make use of the facilities at VSL and at the Delft University of Technology. Contact Peter Lucas (plucas@vsl.nl, 015 2691538) or Kees Vuik (C.Vuik@tudelft.nl) for more information.