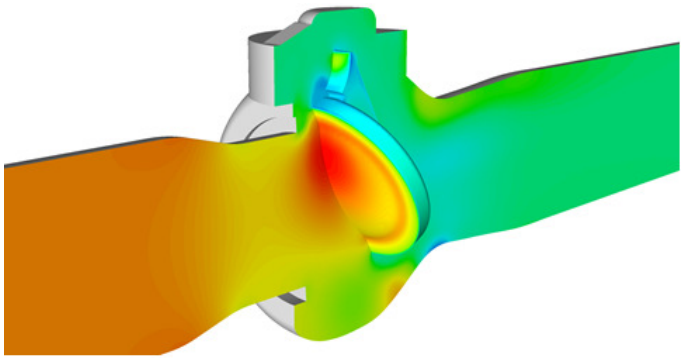
FS Dynamics is a focused and independent consultancy company providing highly skilled competence within fluid- and structural dynamic analysis. We are recruiting excellent engineers with equality and diversity in mind and can offer our employers competence development, a work environment surrounded by satisfied and motivated colleges at the leading consultancy company within technical calculations.

Master Thesis work about

Dynamic CFD study of a swing check valve

FS Dynamics has a well-developed cooperation with Swedish and Finnish nuclear power industry where FS Dynamics contributes with experience and deep theoretical knowledge within various simulations. The nuclear power plants are required to verify that piping systems can withstand the loads that the systems are exposed for. As part of that verification, the loads from the water or steam due to pressure waves are analyzed. Pressure waves can be caused by e.g. valve operations, pump trips, pipe break and steam collapse. In existing calculation tools, the system and components are modelled in one dimension along the axis of the piping. The modelling of swing check valves is crucial and has been dissatisfactory in the past. Recently a new promising model for swing check valves has been developed. This model, however, requires dynamic coefficients dependent of various quantities which are not commonly available from the valve manufactures.

In two previous Master Thesis projects, the dynamic behavior of a swing check valve subjected to a pipe-break and a pump-stop transient has been investigated using CFD. The idea of the present Master Thesis proposal is to continue the analysis and set up appropriate transient simulations to map up the dynamic coefficients needed for the dynamic 1D swing check valve model. The aim of the project is to construct the required dynamic coefficients with the help of CFD, simulate several load cases involving a swing check valve both with 1-dimensional (1D) modelling and 3-dimenstional (3D) CFD analysis and compare the results. The project is of a high technical level and if it is successful it will be of great benefit within the nuclear power industry.



Outline of the project:

1. Literature study of previous work regarding the dynamics of swing check valves.
2. Design methodology for dynamic coefficient calculation using CFD.
3. Performing transient 3D CFD analysis to calculate dynamic coefficients for 1D modelling.
4. Set up several load cases involving a swing check valve and performing 1D analysis.
5. Evaluation the 1D modelling with 3D CFD results.
6. Summary in report.

The assignment is suitable for one student with genuine interest of technical simulations within fluid dynamics. The assignment is done at earliest the spring semester of 2017 at FS Dynamics's office in Stockholm at supervision of two experienced engineers within CFD and thermo-hydraulics.

Contact person at FS Dynamics:
Ori Levin, PhD
Manager Fluid Dynamics Stockholm
Phone: +468-410 532 65
E-mail: ori.levin@fsdynamics.se