MASTER THESIS

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Fluid structure interaction in a pipe

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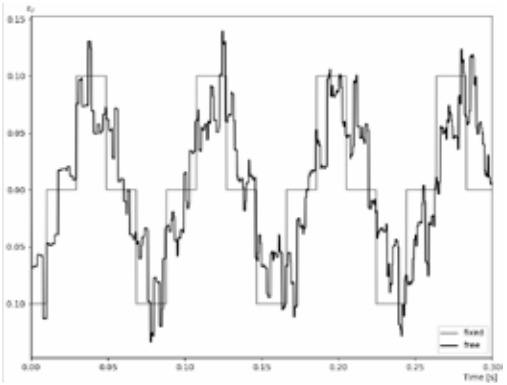
Background

Sudden changes in steady state conditions in piping systems, such as valve closure and component load rejection, may lead to extreme changes in pressure forces acting on the pipe. To accurately predict these forces and resulting stresses and strains on the pipe wall, coupled fluid-structure interaction investigations are needed.

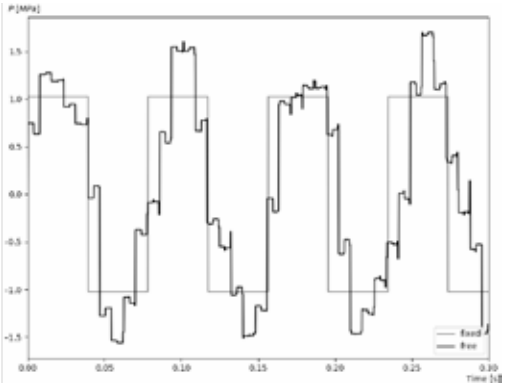
The purpose of this thesis is the experimental and numerical investigation of the waterhammer event due to rapid valve closure.

A straight pipe test rig in the Waterpower Laboratory are to be used to verify predictions from a computer program which solves the extended waterhammer equations using the method of characteristics.

To do this sufficiently, measurements of the pressure and strain, as well as acceleration of the rig, will be conducted, analyzed and compared to the numerical predictions for the computer program.



Simulated strain development at pipe center after instantaneous valve closure



Simulated pressure development at valve after instantaneous valve closure