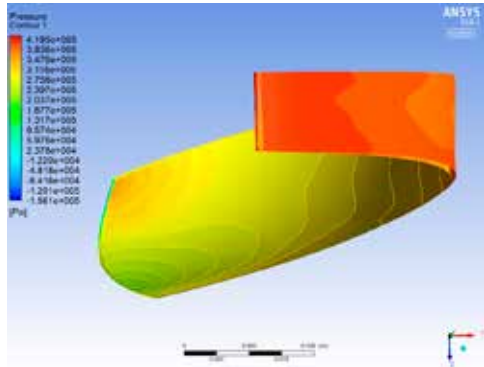


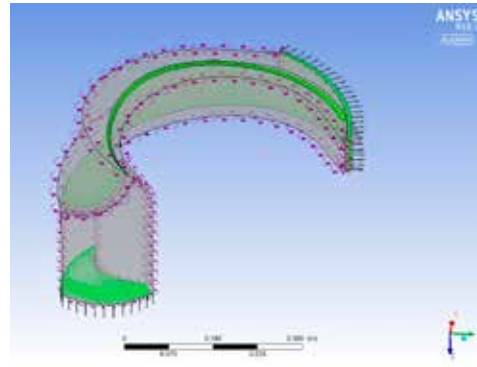
Background and objective

A limiting factor for operation of a reversible pump turbine (RPT) is cavitation. To avoid cavitation the units must be submerged, which is an expensive action. Adding a rotation to the flow before it enters the inlet of the runner (pre-rotation) might be an effective countermeasure for cavitation, reducing the necessary submergence. Pre-rotation might also change the pump characteristic curves, indicating that it can be used to control the operation of the pump.



Contour plot of the pressure across the runner of an RPT for a flow with no pre-rotation at the inlet.

The objective of this thesis is to conduct an investigation of the effect of pre-rotation with respect to characteristics and cavitation, and conclude whether pre-rotation has the desired effect or not for an actual model of an RPT runner. The simulations are carried out in ANSYS CFX.



Visualization of the flow direction and the runner inside the simulation domain.

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Simulation of pre-rotation in the flow at the inlet of a reversible pump turbine

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