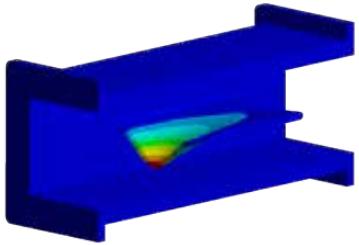
Background

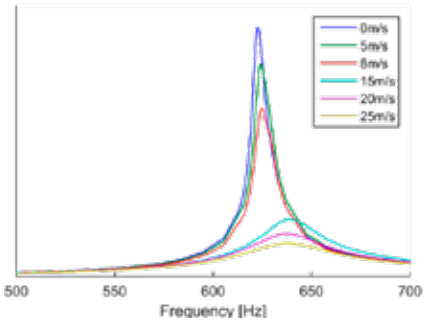
In the last two decades several high head Francis turbines have failed due to rotor-stator interaction (RSI) and resonance issues.

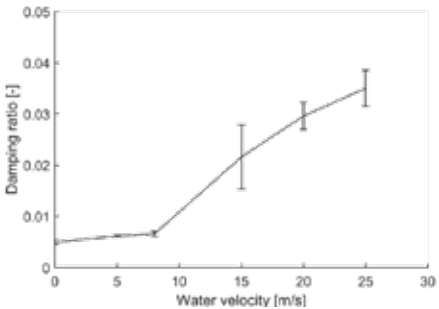
Some have failed after a few hours, others have lasted months, or years, before failing. To prevent such failures, it is important to understand the physics behind these failures.

Every harmonic oscillating system consists of a natural frequency and a damping. In order to predict the frequency response of such a system, both the natural frequency and damping must be known. Since resonance plays an important role in many of the failures, the effect flowing water has on the natural frequency and damping is considered a natural starting point in this research.

There is currently no research openly available for all turbine manufacturers to validate their numerical tools with respect to damping and natural frequency. This experiment aims to improve the knowledge on the fluid structure interaction (FSI) between flowing water and oscillating structures, while at the same time providing an open platform to validate numerical tools.







Bjørn Winther Solemslie

Department of Energy and Process Engineering

2016 - 2018

Pressure pulsations and fatigue in high head francis turbines

Supervisor:
Ole Gunnar Dahlhaug

NTNU

POST DOC.