

Applying Design of Experiments Method for the Verification of a Hydropower System

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Today, renewable energy plays a major role in the transition towards environment-friendly energy sources. Hydropower is one of the most important renewable energy sources leading to the high interest of research associated with the development of new technologies. These technologies aim to examine and predict the characteristics and behaviour of hydropower plants during different operating conditions and are often associated with simulation models. In the progress of creating accurate simulation models, it is necessary to have an organised and systematic method to verify and optimise the model with the help of available data. This is where the “Design of Experiments” (DoE) principles should be applied.

A simulation model of a reference hydropower plant located in Seljord municipality in the south-east of Norway was implemented using the modelling language Modelica. All parts of this hydropower plant model were tuned according to DoE procedure with the purpose of design verification and optimisation. The results of the experiments are a complete and optimised hydropower plant model that gives reliable simulation results.

