PhD Proposal

Modeling and Control of Hydraulic Turbines For the Integration of Renewable Sources of Energy

Context

The increasing demand in flexibility of hydraulic machines due to their new role in the integration of renewables forces them to operate on a significantly larger domains than before. Moreover, the requirements in terms of stability and the response time becomes tighter. This questions the commonly used models and control design approaches and fires the need for a more involved advances in both sides.

The InnovHydro project funded by the French Public Investment Bank (BPI) gathers the joint efforts of Alstom (worlwide turbine leader) to many public research labs on various topics in order to address this multi-disciplinary challenge.

This proposal concerns the control design and optimization task for which GIPSA-lab (Grenoble) is responsible. (http://www.gipsa-lab.fr)

Scope of This Job Offer

The PhD objective is to develop a model structure and a corresponding parametrized control design framework that enables the closed-loop system to fulfill the new requirement discussed above. This obviously involves a first reduced modeling phase, a control/estimation design phase and a post processing phase. In the latter, the parametrized closed-loop is used in an outer economic constrained optimization framework in order to optimize the design and to give actuators and sensors specification including those impacting the re-design of these equipments towards meeting the new context design specifications.

Needed Skills

Successful applicants should have the following skills:

✓ Solid background in control systems design theory
✓ Solid knowledge of Matlab/Simulink environment.
✓ Good knowledge in power systems related topics.
✓ Fairly good knowledge in constrained optimization

Period

The offer starts in September/October 2015 for three years.

To apply

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