Institute of Electrical Power Systems

Master Thesis

Modelling of penstocks for pumped storage hydropower plants

Motivation

Due to the increasingly volatile generation structures, it is necessary to create storage facilities which, in addition to a large storage energy, also have a high degree of flexibility. Pumped storage power plants are particularly suitable for this purpose in the Central European region, as they usually offer a high energy content due to their large differences in altitude (high potential energy) and the large storage volume. A combination of machine sets and converters additionally increases the already high degree of flexibility in new power generation plants. Above all, this combination offers the possibility of operating the machine sets at variable speeds and achieving improved efficiency. An important component of the pumped storage power plant is the penstock, which is a nonlinear hydraulic system. In this work a nonlinear model of a penstock for a network calculation program shall be created, which should be available as a model block for future simulations.

Research Topics

- Creating a nonlinear model of a penstock

Procedure/Methodology/Task definition

- Literature research
- Modeling with the simulation software “DIgSILENT-PowerFactory”
- Behavioral analysis

Organisational Issues

Beginn immediately

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