

## 电力系统

### 大型水电机组与交直流互联电网的耦合作用

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#### 摘要:

建立了考虑尾水管压力动态特性的水轮机模型, 以向家坝—上海直流输电工程为例, 分析了联网和孤岛运行方式下水力系统参数(如水力启动时间)变化、水轮机尾水管压力脉动引起的水电机组与交直流互联电网的耦合作用的变化。仿真结果表明, 水力启动时间对送端系统的频率特性影响较大, 水轮机尾水管压力脉动会引起发电机组输出功率的脉动, 严重时可能威胁电力系统稳定运行。实际系统运行中, 可通过减小或消除尾水管涡带和采取直流调制措施来减小尾水管压力脉动对电力系统运行带来的危害。

#### 关键词:

### Analysis on Coupling of Large Hydraulic Turbine With AC-DC Interconnected Power System

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#### Abstract:

A hydraulic turbine model, in which the dynamic characteristic of draft tube pressure is taking into account, is built. Taking HVDC power transmission project from Xiangjiaba to Shanghai for example, the parameter variation of hydraulic system, e.g., the starting time of hydraulic power, under islanded operation mode and interconnected operation mode, the change of the coupling between hydraulic power generation set and AC-DC interconnected power grid, that is caused by pressure pulse of draft tube, are analyzed. Simulation results show that starting time of hydraulic power greatly influences the frequency characteristic of power system at sending end; the pressure pulse of draft tube may cause the pulse in output power of generation sets, and serious pulse of output power jeopardizes steady operation of power grid possibly. As for the operation of actual power grid, the damage of pressure pulse of draft tube to power system stability can be mitigated by reducing or eliminating the vortex strip in draft tube as well as by DC power modulation.

#### Keywords:

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