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Dynamic analysis of steam dump system of SMR

The steam dump system of nuclear power plant is designed to provide an artificial secondary side load that balances the power difference between the reactor and the turbine. The steam dump system, including both process and control elements, is one of the most complicate systems in nuclear power plant, which is closely related to reactor power control, feedwater control and other process. Especially for some small modular reactors which apply once through steam generators, the characteristic is much different from the traditional NPP. In this paper, a full scope APROS model including reactor core, primary/secondary circuit and I&C system for Hainan Changjiang SMR (ACP100) is built.
The large-load reduction transient such as load reduction to house load and turbine trip condition are analyzed using full-scope ACP100 APROS model. The dynamical-varying of important variables such as primary side temperature, reactor power, steam pressure etc. are recorded and studied. Optimization and improvements are made to the control logic to avoid the overpressure of the secondary circuit and the opening of main steam safety valve opening under the most unfavourable situation.

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