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200MW低温供热堆容积补偿器仿真

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摘要 建立高精度的容积补偿器仿真模型是实现200MW低温供热堆全系统仿真的重要环节。本工作将容积补偿器内的水区分成波动水区和主水区,由此建立了有别于二区模型的氮气区、主水区和波动水区三区模型。建模时,对氮气区分别按接近真实空间气体变化的多变过程或按容积补偿器阀门打开的等温过程和阀门关闭的绝热过程进行模拟,前者更接近真实空间气体性质的变化过程。选用吉尔方法求解微分方程。计算结果表明:三区模型更精确地描述了容积补偿器的热工水力特性。本研究结果为低温供热堆及其非能动余热排出系统的设计和运行提供了有价值的分析方法。

关键词 [低温供热堆](#) [容积补偿器](#) [三区模型](#) [仿真](#)

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Simulation of Volume Compensator in 200 MW Low-Temperature Heating Reactor

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Abstract The establishment of the simulation model of the volume compensator is significant for the simulation of operation of 200 MW low-temperature heating reactor. In the paper, the water region of the volume compensator was divided into water fluctuation region and main water region, and three regions, nitrogen region, main water region and water fluctuation region occur in the simulation model of the volume compensator. This three region model is different from two region model available. The behavior of the nitrogen in the volume compensator was simulated by polytropic process similar to real variety process of gas, or constant temperature process of gas with the valve opening in the volume compensator and adiabatic process of gas with the valve closed in the volume compensator, respectively. The former were closed relatively to real variety process of gas space nature. The differential equations were solved by using Gear method. The calculated results show that the model presented in the paper can simulate the behavior of the volume compensator well. This study provides a valuable method for the design and safe operation analysis of the 200 MW low-temperature heating reactor.

Key words [low-temperature heating reactor](#) [volume compensator](#) [three region model](#) [simulation](#)

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