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反应堆工程

模块式高温气冷堆预应力混凝土压力容器余热排出系统设计

尹清辽[1, 2]，徐钊[1]，吴莘馨[1]，何树延[1]，孙玉良[1]

1. 清华大学 核能与新能源技术研究院，北京 100084
2. 中国核工业建设集团公司，北京 100037

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摘要 非能动余热排出系统是模块式高温气冷堆（MHTR）实现固有安全性的重要保证。采用预应力混凝土压力容器（PCPV）代替钢制压力容器作为MHTR的一回路压力边界，对余热排出系统设计提出了特殊要求。本文研究提出了模块式高温气冷堆PCPV余热排出系统的设计方案，对余热排出系统的主要设计参数、结构特点和热工水力进行分析。该系统能够保证在事故工况下仅依靠自然循环实现堆芯余热的非能动排出。

关键词 模块式高温气冷堆 预应力混凝土压力容器 余热排出系统 非能动安全性

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Design of Pre stressed Concrete Pressure Vessel Residual Heat Removal System for Modular High Temperature Gas Cooled Reactor

YIN Qing-liao[1, 2], XU Zhao[1], WU Xin-xin[1], HE Shu-yan[1], SUN Yu-liang[1]

1. Institute of Nuclear and New Energy Technology,Tsinghua University, Beijing 100084, China; 2. China Nuclear Engineering Group Corporation, Beijing 100037, China

Abstract Passive residual heat removal system is the key assurance for the inherent safety of modular high-temperature gas-cooled reactor (MHTR). With application of pre-stressed concrete pressure vessels(PCPV) instead of steel pressure vessels as the primary circuit pressure boundary of MHTR, the residual heat removal system must be designed specially. The paper provides PCPV's residual heat removal system design concept for MHTR, and presents its main technical characteristics, structural peculiarity and the thermal-hydraulic analysis. The system can ensure to passively remove the reactor core decay heat only by means of natural recirculation during accidents.

Key words modular high-temperature gas-cooled reactor pre-stressed concrete pressure vessel residual heat removal system passive safety

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