原子能科学技术 2005 (S1): ISSN: 1000-6931 CN: 11-2044/TL

A

10MW高温气冷堆燃料元件辐照后检验

@唐春和$清华大学核能与新能源技术研究院!北京102201 @符晓铭$清华大学核能与新能源技术研究院!北京102201 @朱钧国$清华大学核能与新能源技术研究院!北京102201 @张纯$清华大学核能与新能源技术研究院!北京102201

收稿日期 2005-1-5 修回日期 网络版发布日期:

摘要 为了评价10MW高温气冷堆(HTR10)用燃料元件的性能,从第1和第2生产批次中分别随机抽取两个球形燃料元件进行辐照考验。辐照考验在俄罗斯的IVV2M堆内进行,采用动态辐照试验的方法,可分别控制每个辐照盒中燃料元件的温度和测量气态裂变产物的释放。辐照后检验包括外观检查、尺寸测量、固体裂变产物在基体石墨内的分布测量、包覆燃料颗粒破损率测量和金相观察。辐照后检验结果表明:辐照没有引起燃料元件中包覆燃料颗粒的破损,生产的燃料元件满足10MW高温气冷堆的设计要求。

关键词 高温气冷堆 球形燃料元件 包覆燃料颗粒 辐照考验 辐照后检验

分类号 TL352.28

Post-irradiation Examination of 10 MW High Temperature Gas-Cooled Reactor Fuel

TANG Chun-he, FU Xiao-ming, ZHU Jun-guo, ZHANG Chun (Institute of Nuclear and New Energy Technology, Tsinghua University, Beijing 102201, China)

Abstract In order to evaluate the performance of the fuel elements, which were produced for the 10 MW high temperature gas-cooled reactor(HTR-10), the irradiation test of two spherical fuel elements sampled randomly from the first and second product batches, respectively, was performed in an irradiation facility with in-pile gas loop of the Russian IVV-2M research reactor. The temperature of the fuel element in each irradiation capsure and release of gas fission products from the irradiated fuel element can be controlled and measured, respectively. The post-irradiation examination(PIE) contains visual inspection, dimension measurement for the irradiated fuel element, determining the distribution of the solid fission products in the matrix graphite along the ball diameter, measuring the failure fraction of the loose coated fuel particles obtained from the ball deconsolidation, ceramography examination of the failed and intact particles. The PIE results show no any failure of coated fuel particles was induced by the irradiation and the produced fuel element can meet the design requirement of HTR-10.

Key words high temperature gas-cooled reactor spherical fuel element coated fuel particle irradiation testing post-irradiation examination

DOI

通讯作者