原子能科学技术 2012 46 (3): 277-281 ISSN: 1000-6931 CN: 11-2044/TL

反应堆工程

聚变-裂变混合能源堆球模型中子学对算研究

邵增;程和平;刘国明

中国核电工程有限公司，北京100840

收稿日期 修回日期 网络版发布日期:

摘要 利用蒙特卡罗程序和自主开发的蒙特卡罗-燃耗耦合程序MOCouple-s，对北京应用物理与计算数学研究所提出的聚变-裂变混合能源堆球模型进行了对算研究。对初始时刻及各燃耗时刻下的有效增殖因数、能量倍增因子、氚增殖比、中子源强度等堆芯参数进行了比较，结果总体符合较好。对寿期末重要核素的成分进行了详细比较，除个别核素外，偏差很小，表明所采用的计算程序与核参数库一致性良好。对核参数库的选择、铀水体积比等对燃耗计算结果的影响进行敏感性分析，并对外中子源驱动的次临界堆芯的燃耗计算进行详细讨论，提出可行的燃耗计算基准。

关键词 混合堆 球模型 对算研究 燃耗 铀水体积比

分类号

Comparative Study on Spherical Model of Fusion-Fission Hybrid Energy Reactor

SHAO Zeng;CHENG He-ping;LIU Guo-ming

China Nuclear Power Engineering Co., Ltd., Beijing 100840, China

Abstract The comparative study on fusion-fission hybrid spherical model proposed by the Institute of Applied Physics and Computational Mathematics was performed with Monte-Carlo code and MOCouple-s code. Comparisons of reactor parameters, such as neutron effective multiplication factor, energy multiplication factor, tritium breeding ratio and neutron source intensity, were made. The results agree well with the reference as a whole. The concentrations of important isotopes were also compared in detail. Most of the biases are very small except a tiny fraction of the iotopes. It proves that both codes and nuclear data library have very good consistency. In calculation of the model used, the burnup sensitivity of nuclear data and uranium-water ratio employed in the simulation model were analyzed. For such a fixed external source driven subcritical reactor core, detailed discussion was made about the burnup calculation method, and a feasible burnup calculation benchmark was proposed.

Key words hybrid reactor spherical model comparative study burnup uranium-water ratio

DOI

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