原子能科学技术 2008 42 (12): 1103-1108 ISSN: 1000-6931 CN: 11-2044/TL

反应堆工程

新概念熔盐堆物理计算方法研究及程序设计

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收稿日期 2007-8-1 修回日期 2007-10-23 网络版发布日期: 2008-12-20

摘要 考虑新概念熔盐堆燃料盐的流动特性，从基本的粒子守恒方程出发，推导了熔盐堆的中子动力学模型，并采用数值方法对3种工况下熔盐堆的临界问题进行计算，考察流动对有效增殖系数、快中子分布、热中子分布及缓发中子先驱核分布的影响。结果表明：质量流量对有效增殖系数的影响很小，对热中子分布的影响比对快中子分布的影响大，而质量流量越大，缓发中子先驱核移出堆芯的比率也越大。

关键词 熔盐堆；中子动力学模型；中子扩散；缓发中子先驱核；流动效应；数值计算

分类号 TL426；TL325

Nuclear Calculation and Program Development for Molten Salt Reactor

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Abstract Considering the fuel salt flow effect of the molten salt reactor, the neutron dynamic model was derived based on the particle conservation equations, and the critical problem was calculated by numerical method under three working conditions to study the flow effect to effective multiplication factor, fast neutron, thermal neutron and delayed neutron precursors distribution. The calculated results show that the influence of mass flow on the effective multiplication factor is very small, and the influence on the thermal neutron distribution is larger than that on the fast neutron distribution. In addition, the percentage of the delayed neutron precursors moving out the core increases with the increasing mass flow.

Key words molten salt reactor; neutron dynamic model; neutron diffusion; delayed neutron precursors; flow effect; numerical calculation

DOI

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