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共振计算的子群法与广义 Stamm'ler 方法的对比研究

摘要

子群法和广义 Stamm'ler 方法是两种经典的共振自屏计算方法，已被广泛用于共振处理，显示出很好的计算精度与几何处理能力。最近，基于高温气冷堆栅格物理程序 XPZ，开发了两种方法，用于双重非均匀性系统的共振处理。本文通过理论与数值分析表明，两种方法在单共振区系统以及考虑分布式自屏效应的多共振区系统中是等价的，在双重非均匀性系统中仍然有效。基于高温气冷堆燃料颗粒与燃料球的数值验证表明两种方法计算有效多群截面与有效增殖因子的一致性，进一步证明了理论结论。

关键词

共振自屏计算；子群法；广义 Stamm'ler 方法

Abstract

The subgroup method and the generalized Stamm'ler method are two classical methods for resonance self-shielding calculation, which have been used in resonant self-shielding calculation and shown good accuracy and geometric adaptability. Recently, the two methods have been implemented in XPZ code for resonance treatment with double heterogeneous geometry in high temperature gas cooled reactors (HTGRs). This paper presents a comparison study on the two methods in both theoretical and numerical analyses. It is found that the two methods have equivalent accuracy in case of single resonance region or distributed multi-resonance region, regardless of double heterogeneous system. Numerical results are presented for HTGR fuel particle and element, which demonstrate the consistency of the two methods in effective multi-group cross sections and multiplication factors

Keywords

resonance self-shielding;subgroup method;generalized Stamm'ler method

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