

反应堆工程

# 用高阶泰勒多项式积分方法求解点堆中子动力学方程

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**摘要** 在求解点堆中子动力学方程组中, 对中子密度使用分段全隐式高阶泰勒多项式近似技术, 给出一求解点堆中子动力学方程组的数值积分方法, 并对该方法进行了修正优化。实例计算并与传统的三阶Hermite插值多项式法的比较表明: 该方法能显著消除刚性方程组带来的数值计算不利因素, 对给定的反应性输入能够取得较高精确度的数值结果, 计算过程简洁, 且计算速度快, 通过对高阶泰勒多项式的修正, 计算精度有了进一步提高, 可适宜于反应堆中子动力学控制的设计分析和仿真计算。

**关键词** [点堆中子动力学](#) [刚性](#) [全隐式](#) [泰勒多项式](#) [数值积分](#)

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## High Order Taylor Polynomials Method for Solving Point Reactor Neutron Kinetics Equation

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**Abstract** A numerical method solving the point reactor neutron kinetics equation by using the technique of second-order Taylor polynomials for the approximation of the neutron density in integral of one step was presented and optimized. The stiffness of the equations was overcome by the full implicit formulation. The numerical results show that for reasonable reactivity inputs, a sufficient accuracy can be achieved in Taylor polynomial approach presented here. When the reactivity is given, this method can provide a straight forward computation procedure for solving reactor dynamics problems quickly. And this method is more accuracy after amended. This numerical method can be used to the design analysis and simulation computation of reactor control.

**Key words** [point reactor](#) [neutron kinetics](#) [stiffness](#) [implicit](#) [Taylor polynomials](#) [numerical](#) [integral](#)

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