두 노드 다군 중성자 확산 문제 해석을 위한 통합노달법과 준해석적 노달법의 비교

A Comparison between Unified Nodal Method and Semi-Analytic Nodal Method for Two-Node Multi-Group Neutron Diffusion Problem

이현철, 주형국
한국원자력연구소

김창효
서울대학교

요약

다군 비선형 소격격자차분 노달법에 필요한 1차원 두 노드 다군 중성자 확산 문제 해법으로 통합노달법(UNM)과 준해석적 노달법(SANM)을 2군과 8군 문제에 대해 각각 비교하였다. 근사적 UNM/ANM과 4차 유효선원항을 이용한 SANM은 매우 정확한 결과를 보였다. 전산시간 면에서는 8군 까지는 근사적 UNM/ANM이 훨씬 유리했으나 더 많은 군수에 대해서는 SANM이 유리해 질 것으로 예상된다. 따라서 이 두 방법은 서로 보완적으로 사용될 수 있을 것이다.

.....

A Spectrum Correction Method for Fuel Assembly Rehomogenization

Kyung Taek Lee and Nam Zin Cho
Korea Advanced Institute of Science and Technology

Abstract

To overcome the limitation of existing homogenization methods based on the single assembly calculation with zero current boundary condition, we propose a new rehomogenization method, named spectrum correction method (SCM), consisting of the multigroup energy spectrum approximation by spectrum correction and the condensed two-group heterogeneous single assembly calculations with non-zero current boundary condition. In SCM, the spectrum shifting phenomena caused by current across assembly interfaces are considered by the spectrum correction at group condensation stage at first. Then, heterogeneous single assembly calculations with two-group cross sections condensed by using corrected multigroup energy spectrum are performed to obtain rehomogenized nodal diffusion parameters, i.e., assembly-wise homogenized cross sections and discontinuity factors. To evaluate the performance of SCM, it was applied to the analytic function expansion nodal (AFEN) method and several test problems were solved. The results show that SCM can reduce the errors significantly both in multiplication factors and assembly averaged power distributions.