Two-Node Nonlinear Iterative AFEN Method
in Three-Dimensional Geometry

Do Sam Kim and Nam Zin Cho

Korea Advanced Institute of Science and Technology
Department of Nuclear Engineering
373-1 Kusong-dong, Yusong-gu
Taejon, Korea 305-701

Abstract

The nonlinear iterative scheme using two-node AFEN calculation is extended to three-dimensional rectangular geometry and applied to two well-known benchmark problems. This scheme is based on solving two-node problems with AFEN method flux expansion and use of two nonlinear correction factors at every interface instead of one factor in the conventional scheme. The use of two correction factors provides higher-order accurate interface fluxes as well as currents which are used as the boundary conditions of the two-node problem. The numerical results show that this method gives the same solution as that of the original AFEN method and the computing time is significantly reduced in comparison with the original AFEN method. However, the three-dimensional two-node acceleration scheme needs to update edge fluxes more frequently than that of the two-dimensional calculation to achieve stable convergence.