1. DOE CONTRACT OR GRANT NUMBER

DE-FG07-04ID14607

X New contract Continuation/Revision

2. BUDGET & REPORTING (B&R) CODE

AF40

3. PRINCIPAL INVESTIGATOR

A. Last Martin

First William

B. Affiliation Department of Nuclear Engineering and Radiological Sciences

C. Address University of Michigan, Ann Arbor, MI Zip 48109-2104

D. Phone: Commercial (734)764-5534 FAX (734)763-4540

E. E-mail Address wrm@umich.edu

4. DOE SPONSORING OFFICE (e.g., ER-34)

NEER

5. TITLE OF PROJECT

Global Monte Carlo Simulation with High Order Polynomial Expansions

6. PROJECT DESCRIPTION:

This is a research project involving the development of a computational methodology to predict the global neutron scalar flux and thermal power profiles throughout a nuclear reactor. This methodology is based on the utilization of high order polynomials within a Monte Carlo algorithm to accelerate Monte Carlo fission source iterations for loosely coupled reactor systems. Preliminary work has demonstrated the feasibility of using high order polynomials to estimate spatially and angularly varying quantities such as the scalar flux distribution within a lattice or the interface current distribution on a boundary. This work has also led to a second approach based on imbedding this methodology into a response matrix formalism, allowing one in principle to estimate high order response matrices that could be used to estimate global flux and power distributions with improved accuracy and efficiency compared with conventional Monte Carlo methods. These methods should improve the convergence of Monte Carlo fission source iterations for loosely coupled systems.

7. ASSOCIATED REFERENCE NUMBER

8. OUT YEAR COST ESTIMATE (in whole dollars)

FY2005-100,000 FY2006-102,000

9. NON-DOE CONTRIBUTION (percentage whole number)

28%

10. PUBLICATION


11. DATE October 2, 2004