NEER FY 2001 PROJECT ABSTRACT	
Grant Number:	01ID14113
Project Title:	Radiation Transport Code Quality Control Using Analytical Benchmarks
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Abstract:	Verification of large?scale computational algorithms used in nuclear engineering and radiological applications is an essential element of reliable code performance and quality assurance. For this reason, the development of a suite of multidimensional semianalytical benchmarks is proposed to provide independent verification of proper operation of codes and algorithms concerning the transport of neutral particles, possibly in life?critical applications. The benchmarks considered will treat multidimensional/few group fixed source and criticality transport scenarios. The solution to the neutral particle transport equation features a new innovative Fourier transform technique based on the analytical moments representation of the Green's function called the Green's Function Method (GFM). By application of Placzek's lemma in slab geometry, the Green's function is incorporated into a set of integral equations for the boundary fluxes. Through a numerical Fourier transform inversion and subsequent matrix inversion for the boundary fluxes, a semi?analytical benchmark emerges. Multidimensional solutions for a variety of infinite media will be based on the isotropic point source Green's function derived directly from the slab case. It is proposed to directly incorporate these benchmarks into existing patient treatment planning codes such as Peregrine and MCNP4 and all purpose deterministic codes such as ATILLA in order to detect unintended source code modifications and anomalies associated with the computational environment.