NEER FY 2001 PROJECT ABSTRACT	
Grant Number:	01ID14112
Project Title:	Novel Approaches to Adaptive Angular Approximations in Computational Transport
Lead PI:	Marvin Adams, Texas A&M University
Abstract:	Considerable recent research has been devoted to spatial discretization of the transport equation, but less to the extremely challenging angular discretization. The challenge arises from the difficulty in accurately approximating, by quadrature sums, angular integrals that contain the very sharply peaked or even discontinuous angular fluxes that are commonplace occurrences. Inaccuracies in the transport solution, including "ray effects," arise when these quadrature sums are inaccurate. We believe that angular discretization is presently the weakest link in deterministic transport calculations, and propose to strengthen this link with two complementary approaches, intended respectively to explore a promising alternative to the classical discrete-ordinates approach and to modify that classical approach. The alternative to classical discrete ordinates will employ spatially adaptive quadrature sets, in order to tailor the degree of accuracy of the angular quadrature to the needs of specific spatial regions. This approach is intended to lead to employment in standard discrete-ordinate codes. The modification of the classical approach will use the emergent wavelet technology as the basis for angular approximations in the underlying angular expansion. This approach offers much promise in reducing the number of coefficients required for a given accuracy in the angular expansion.