SAND2020-4210C

Verification Of Deterministic Radiation Transport Codes

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The linear Boltzmann radiation transport equation consists of independent variables in space, particle energy, and particle direction of travel. Common “deterministic” discretizations of this equation use finite elements in space, multigroup in energy, and discrete ordinates or spherical harmonics in angle. Each of these phase-space discretizations have different properties, requiring different approaches to code verification. We describe some of the approaches we have used to date and possible future work. In particular, we use a combination of “exact” manufactured test problems, in which the angular flux solution can be obtained without any truncation error by a transport code, and “inexact” manufactured test problems, in which truncation error is present in the spatial variables but subject to convergence rates governed by h-refinement rules.

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