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A comparison of iterative techniques for the solution of the time dependent Boltzmann equation for radiation transport.

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The discrete ordinates Boltzmann equation is often employed to describe radiation transport and radiation hydrodynamics in a variety of physical contexts. Usually the solution of this equation relies on the use of implicit finite-difference, finite-volume, or finite-element methods. The use of implicit methods gives rise to large, sparse linear systems which mush be solved at every timestep of a simulation. One widely used method of iteratively solving this linear system involves splitting the linear system through a method known as *source-iteration*. This particular iterative method has been favored by the nuclear engineering community. However, this method suffers from a number of difficulties including convergence problems in the diffusive limit and algorithmic impediments to parallel implementation. An alternative method for iteratively solving the linear system is to attack the full, i.e. unsplit, linear system with Krylov subspace techniques combined with parallel preconditioners. In this talk we present results from a comparison of the source-iteration and full-linear-system approaches on a series of radiation transport test problems. Our study addresses the issues of both numerical and parallel efficiency of these two different iterative methods.