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Investigation of Mixed Cell Treatment via the Support Operator Method[1] NICK PATTERSON, KATSUYO THORNTON, U of Michigan — A support operator method (SOM) discretization of the diffusion equation is used to examine treatment of mixed cells. The diffusion equation is used to simulate radiation transport in optically thick system. Multiple fluids or species can be simulated by assigning distinct diffusivities to different regions of the computational domain. A mixed cell occurs when the boundaries of the fluids do not align with the boundary of the mesh cells. The SOM discretizes the diffusion equation into a symmetric and positive-definite matrix system, which allows for more efficient solvers. The SOM is spatially second-order accurate for isotropic, anisotropic, continuous, or discontinuous diffusion coefficients. The use of anisotropic diffusion tensor is explored as a means of simulating the material interface in a mixed cell by rotating a diagonal diffusion tensor. The results are compared with more typical mixed cell treatments, such as global or local grid refinement, or setting the diffusivity equal to that of the fluid occupying the largest volume of the cell.

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