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Performance of Woodcock delta-tracking in lattice physics applications using the
Serpent Monte Carlo reactor physics burnup calculation code

Delta tracking is the process of homogenizing a material to create a simple cross section across the entire core. In doing this you don't need to worry about interfaces and can greatly reduce the number of computations required during the monte carlo simulation. Serpent is able to implement this method as well as do a hybrid surface and delta-tracking simulation. This method is poor in low density materials but can be overcome by using virtual collisions. The authors showed that this would substantially increase the calculation time however.

This method was able to be used to simulate a HTGR much quicker than the normal ray tracing method to acceptable accuracy. It seems as though this method could be implemented into all monte carlo codes to improve the speed of calculations for a reactor core. This method is poor for detector and shielding calculations however, when knowing the exact collision rate in a material is important. This method can also run into problems around localized heavy absorbers.