

## A Deterministic Electron Transport Algorithm for Radiation Dosimetry

As part of our efforts to produce a coupled photon/electron dose calculation tool, an electron transport algorithm is currently under development. Similar to Monte Carlo methods, this algorithm incorporates bremsstrahlung production, ionization and multiple scatter in heterogeneous media. Unlike Monte Carlo methods, which compute dose stochastically by following individual particle histories, this method seeks to compute dose deterministically. Given a heterogeneous material lattice and an electron source, a ray-tracing algorithm is used to determine the electron energy incident upon each lattice element. Secondary radiation and scattered electron distributions are then obtainable from the appropriate cross sections and multiple scattering formalism. Hence, each lattice element can function as a secondary radiation source. By coupling surrounding lattice elements along ray lines to these secondary radiation sources, the dose contribution to the surrounding lattice elements is calculated by combining a ray-tracing algorithm with a weighting factor related to the coupling angle. The process repeats itself for higher orders of interaction. Preliminary results include dose distributions from both external electron fields and internal electron sources (e.g. secondary electrons from Compton scatter). Results are compared with Monte Carlo calculations.