Second Workshop Radiotherapy & Mathematics

Title: Reduced angular moment model for the transport of electron particles in classical and relativistic regime

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Summary: The kinetic computation of the relativistic electrons transport from Maxwell-Fokker-Planck equations for electrons is too expensive to be useful in practical computations.

To overcome this drawback, we derive a new model which involves an angular closure in the phase space and retain only the energy of particles as kinetic dimension. The model is exact for the transport of the beams and the isotropic regime. This model has the accuracy of the kinetic model and the cheap character of the macroscopic Euler model.

The model can be formulated as a multi-group hyperbolic system of conservation laws and can be approximated with the usual numerical schemes of the non-linear hyperbolic analysis thanks to approximate Riemann Solver and high order TVD extensions. The generalization to the relativistic case will be also introduced.

Some numerical examples are shown to illustrate the efficiency of this approach. Different configurations relevant to Radiotherapy are presented.