

TEMPLE UNIVERSITY
Department of Mathematics

Applied Mathematics and Scientific Computing Seminar

Room 617 Wachman Hall

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Numerical Methods for Radiotherapy Dose Calculation using PDEs

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Abstract.

Treatment with high energy ionizing radiation is one of the main methods in modern cancer therapy that is in clinical use. During the last decades, two main approaches to dose calculation were used, Monte Carlo simulations and semi-empirical models based on Fermi-Eyges theory. A third way to dose calculation has only recently attracted attention in the medical physics community. This approach is based on the deterministic kinetic equations of radiative transfer.

In this work, we present a Boltzmann transport model for dose calculation in radiation therapy. We derive a continuum approximation to this model using the method of moments. We then construct a numerical scheme that preserves key properties of the system. Numerical results in one and two dimensions are presented.