



復旦大學
FUDAN UNIVERSITY

Applied Math
Ph.D. Seminar

A fast offline/online forward solver for stationary inverse transport equation with large datasets

Speaker: Jingyi Fu (Shanghai Jiao Tong University)

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Location: Rm 1801, Guanghua East Tower

Advisor: Min Tang (Shanghai Jiao Tong University)

Abstract: It is of great interests to solve inverse stationary radiative transport equation (RTE) with very large data sets. The standard way is to formulate the inverse problem into an optimization problem, but the bottle-neck is that one has to solve the forward problem over and over again which is time consuming. In this paper, we propose an offline/online solver for RTE based on the Tailored Finite Point Method (TFPM). TFPM for RTE is uniformly convergent with respect to the mean free path and valid up to the boundary and interface layers. Two cases are considered, one is to solve the RTE with fixed scattering and absorption cross sections, while the boundary conditions vary; the other is when cross sections vary in a small domain and the boundary conditions change for a lot of times. In these two cases, the solver can be decomposed into offline/online stages. The cost at offline stage is comparable to classical methods, while the cost at online stage is much lower. One only needs to calculate the offline stage once and update the online stage when varying the parameters. Our proposed solver is much cheaper when one needs to solve RTE with multiple right hand sides or when the cross sections vary in a small domain, thus can accelerate the speed of inverse RTE problems.