27TH ICTT: ABSTRACT SUBMISSION FORM

Main deadline: 31 May 2022

Scope

(Please indicate the scope of your contribution, ticking one of the following)

Scientific

Type of presentation

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Moving mesh method for accurate transport benchmarks

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Abstract

Traveling discontinuities in the scalar flux can make accurate solutions to time dependent transport problems can be difficult to achieve. To achieve computationally cheap, accurate solutions to these problems for benchmarks, and eventually to solve radiation transfer problems, we propose a novel Discontinuous Galerkin (DG) and discrete ordinates (Sn) method. In this method, the spatial cell edges are time dependent, allowing them to track and resolve discontinuities in the scalar flux. Additionally, the method leverages the method of multiple flux decomposition and solves for the collided flux from particles that have experienced one or more collisions with an uncollided source, which is the analytic solution to the non-scattering transport equation. Compared to a vanilla DG implementation, the moving mesh, uncollided solutions method gives an 875 times smaller error. Convergence result for a variety of test problems are shown in Fig. 1.

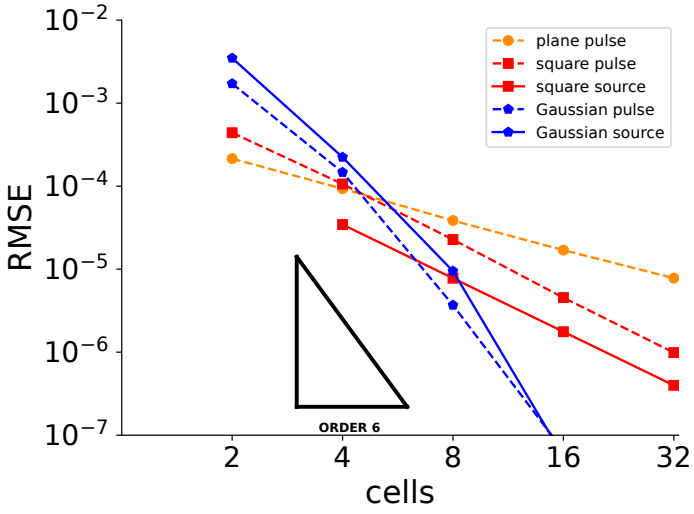

Figure 1: Logscale of root mean square (RMSE) convergence results with a moving mesh, uncollided solutions method for five test problems