Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Smoothing Techniques for Radiative Transfer in Hydrodynamic Simulations[1] GIBSON BENNETT[2], CHRIS FRAZER, FABIAN HEITSCH[3], Univ of NC - Chapel Hill — Interactions between interstellar gases and stellar radiation are an integral part of astronomy; however, including radiation in hydrodynamic simulations can be difficult to model due to exhaustive computational cost. As a result, our ability to simulate processes such as star formation is limited. We have developed an extension to the grid-based hydrodynamics code Athena, using a HEALPix-based ray tree to solve the equation of radiative transfer. With this additional tool, we can aptly model heating due to photo absorption and the ionization of atomic Hydrogen. To minimize computational cost and reduce interpolation effects due to projecting a spherical ray tree onto a Cartesian grid, we implemented an interpolation method based on the triangular-shaped cloud (TSC) method. The interpolation is used in two forms: reverse TSC (rTSC) that builds an interpolated ionization fraction and hydrogen density, and forward TSC (fTSC) that smooths energy deposition. We find that the current implementation of fTSC interpolation does not conserve the photon number, but that the rTSC interpolation can be used to more accurately approximate the resulting ionization fractions.

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Date submitted: 11 Nov 2016 Electronic form version 1.4