FLASH UHD Documentation

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ABSTRACT

The purpose of this documentation is to document the FLASH unsplit hydrodynamics solver and the changes needed to add radiation hydrodynamics to this solver.

1. Introduction

The latest version of the FLASH code is available in my directory
`/data1/r900-1/lindner/FLASH4.2.1/source/`

Most of the files relevant to the unsplit solver are in
`/data1/r900-1/lindner/FLASH4.2.1/source/physics/Hydro/HydroMain/unsplit/Hydro_Unspl`

Any file or directory names I mention will be relative to this directory.

Section 2 contains a basic overview flowchart of how the solver works. There are some brief descriptions of select files as well.

2. General Flowchart

Hydro Main FLASH hydro driver that calls the unsplit solver.

hy_uhd_unsplit This basically runs through the entire unsplit solver. It calls the following functions (`hy_uhd_` prefixes have been ommitted)

putGravityUnsplit

getRiemannState Calculates and stores Riemann state values at cell facethem so we can use these to compute fluxes, e.g. MC 4.2.3

- First, some "'hybrid order"' things that we do not use (?)
- Then, slope flattening is carried out: MC 4.2.2
- Then, we start calculating Riemann states
- **dataReconstOneStep**
- Applies geometric terms

- Updates Gravity
- Stores scratch terms for each direction
- Applies transverse correction terms for 3D
- **upwindTransverseFlux**

getFaceFlux

unsplitUpdate

unsplitUpdateMultiTemp

energyFix

Grid_conserveFluxes

Eos_wrapped

putGravityUnsplit

addGravityUnsplit

energyFix

multiTempAfter