CONSTELATION Inputs

The following document is meant to serve as a supplement to the CONSTELATION README and code. The main purpose of this document is to break down the various inputs used in the code so that a user may easily modify CONSTELATION to fit their own needs. As it currently stands, CONSTELATION is designed to couple a simulation of the HENRI system with a model of the TREAT reactor. However, the process used is conceivably universal for any STAR-CCM+ and SERPENT 2 model. As such the following document will highlight some important inputs used within the code to facilitate the coupling process and provide suggestions on how they might be modified to incorporate separate couplings.

Note:

A Current version of CONSTELATION is necessary for this document to make sense.

1. Initial Code Inputs

The following section will outline the initial part of the CONSTELATION code and its associated inputs. This section of the code is primarily used to set up the initial coupling and ensure both STAR-CCM+ and SERPENT2 have the necessary files that they expect to execute properly.

The following table outlines the major inputs and their purpose:

|  |  |
| --- | --- |
| CONSTELATION INPUT | Purpose |
| timestep | The overall coupled timestep of the simulation. This should match the timestep used for the SERPENT 2 simulation. |
| file\_in | Variable that contains the name of the base SERPENT 2 input file |
| file\_out | Variable that contains various file names, specifically (the new SERPENT 2 input and the interface files) |
| run\_STAR | Variable that contains the name of the STAR-CCM+ submission script |
| STAR\_STEP | The number of timesteps that STAR-CCM+ will simulate before outputting a csv. This should match the update frequency of the table function within STAR-CCM+ |
| Step\_length | A variable that is used to keep the iteration steps constant. Should match the initial STAR\_STEP value. (COULD PROBABLY GET RID OF THIS) |
| STAR\_points | The number of mesh points extracted from STAR\_CCM+. This should match the resolution of the line probe + 1. |
| filename | This should be the location of the initial density and temperature distribution of the csv extracted from STAR\_CCM+ |
| columns | Variable that contains the names of the columns within the STAR-CCM+ csv file. Only the columns that contain the desired information need to be defined. |
| run\_SERP | Variable that contains the name of the SERPENT 2 submission script. |

1. Simulation Inputs

The following section will outline the various inputs used by CONSTELATION once the coupling has been executed. The inputs here are primarily used to define file names, locations, and what inputs were used within the SERPENT 2 detector inputs so that CONSTELATION can read the data effectively.

|  |  |
| --- | --- |
| CONSTELATION INPUT | Purpose |
| outputfile | Variable that contains the name of the SERPENT 2 detector output file |
| Textfile | Variable that contains the name of the base SERPENT 2 input file |
| file\_out | Variable that contains various file names, specifically (the new SERPENT 2 input and the interface files) |
| run\_STAR | Variable that contains the name of the STAR-CCM+ submission script |
| STAR\_STEP | The number of timesteps that STAR-CCM+ will simulate before outputting a csv. This should match the update frequency of the table function within STAR-CCM+ |
| Step\_length | A variable that is used to keep the iteration steps constant. Should match the initial STAR\_STEP value. (COULD PROBABLY GET RID OF THIS) |
| STAR\_points | The number of mesh points extracted from STAR\_CCM+. This should match the resolution of the line probe + 1. |
| filename | This should be the location of the initial density and temperature distribution of the csv extracted from STAR\_CCM+ |
| columns | Variable that contains the names of the columns within the STAR-CCM+ csv file. Only the columns that contain the desired information need to be defined. |
| run\_SERP | Variable that contains the name of the SERPENT 2 submission script. |