RunData Module

# Characteristic scales

# Non-dimensionalizing

|  |  |  |  |
| --- | --- | --- | --- |
| Dimensionless transformations | | | |
|  |  |  | Let  (w/o loss of generality) |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

# Sequence of Calculations

## GIVEN:

## Preliminary Characteristic values:

## Time Scales

## Chosen characteristic Time

The characteristic time is the convective time because that is how time was non-dimensionalized in the B-formulation:

## Real Time Step

## Characteristic Time Step

The characteristic time step is divided by the convective time because that is how time was non-dimensionalized in the B-formulation:

## Characteristic Time

Again, the characteristic time step depends on the smallest characteristic time:

# CFL Condition

Nothing is allowed to flow more than 1 grid spacing within one time step, i.e.

What is usually chosen is

Where, if , then is half the time required for flow to cross one grid spacing. The CFL condition is a necessary (but not sufficient) condition for the stability of ANY explicit differencing method. Note that 4th order accurate derivatives reach TWO grid spaces away. This may change the CFL condition.