Class VTKStencil

Private members

`std::ofstream _outputFile` : The output file stream for writing the VTK file.

`std::ostringstream _pressureStream` : The output string stream into which the pressure values are written during the `apply()` function of the iterator. This is later written into the VTK file.

`std::ostringstream _velocityStream` : The output string stream into which the velocity values are written during the `apply()` function of the iterator. This is later written into the VTK file.

`const int* _localSize` : Pointer to the local size stored in the `ParallelParameters` class. This is used to determine the range of the coordinates.

Private functions

`void writeHeaderAndCoords()` : Writes the header for the VTK file as well as the coordinates. The coordinates are written in the same order as the iterator moves through the grid.

Public functions

`VTKStencil ( const Parameters& parameters )` : Constructor for the VTKStencil class. This sets the `_localSize` and the precision for writing pressure and velocity.

`void apply ( FlowField & flowField, int i, int j )` : The function called by the iterator in the 2D case. If the current cell is a fluid cell then the velocity and the pressure are obtained using the `getPressureAndVelocity()` function of the `flowField` otherwise 0.0 values are appended to the respective string streams. There is a need to skip the first layer in each direction due to the fact that the field iterator starts at the lower, left corner skipping the *extra* ghost layers.

`void apply ( FlowField & flowField, int i, int j, int k )` : Same as above but for 3D case.

`bool openFile ( int timeStep )` : This function opens the file for writing. The name of the file is obtained from the parameters and the time step as well as the extension `.vtk` is appended to it. This function returns whether the file has been opened or not as a boolean value. Only if the file is opened the iterator is called in `Simulation::plotVTK( int timeStep )` and the subsequent `write()` function is called.

`void write ( FlowField & flowField, int timeStep )` : This function writes the VTK file by writing the header, coordinates, pressure and velocity which are already available in the string streams. It closes the file after writing and clears the pressure and velocity string streams for the next time step.

Writing of VTK files in `main()`

Due to the sequential nature of the code the VTK file is written only by the process with rank 0. However, to avoid writing to a file with the same filename when run in parallel, the VTK files are outputted by rank 0 only. The computation of the time at which the VTK file is to be written conforms with that of the std-out which is already present in the code.