

# SUNFLUIDH DATA SETUP

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The file **input3d.dat** is the main data file to prescribe input values to sunfluidh. It contains the major part of data : geometric layout, flow features, boundary conditions, simulation management ... Each part of the file is structured by means of the NAMELIST concept ([click here for more details](#)).

## Content of the data file

Herein the user finds the content of the data file before addressing in details each namelist of the data set:

- The fluid properties
  - Physical properties of the fluid (incompressible fluids, low Mach number hypothesis, multi-components gas, two-phase flows, reactive flow)
  - The reference values of the main physical quantities.
- Field initialization
  - Velocity
  - Temperature
  - Species mass fraction
  - Two-fluids interface (density distribution with discontinuity)
- Forces applied to the fluid
  - Gravity and buoyancy force
  - Sustaining force, etc ...
- Domain configuration
  - geometry of the domain
  - Immersed bodies characteristics (in order to build complex geometries)
  - domain decomposition methods (for parallel computing)
  - mesh characteristics
  - boundary conditions
- Simulation management
  - Numerical methods for solving equations
  - Numerical time step
  - time range of simulation
  - Stopping criteria
  - Backup files, checking files
  - recording rates of data acquisitions
- Data acquisition
  - Time-series
  - Instantaneous fields
  - Statistics

# Namelist lookup list

Click on the highlighted namelist to get more details about it (type of data, definition of data,...)

<b>Fluid Properties</b>	
<a href="#">Fluid_Properties</a>	General properties of the fluid.
<a href="#">Species_Properties</a>	Specific properties of components of the fluid (multi-component flows).
<a href="#">Chemical_Reactions_Features</a>	Group of data on the chemical reaction features (reactive flows only).
<b>Initialization of the velocity, temperature and density over the domain</b>	
<a href="#">Velocity_Initialization</a>	Data for the velocity field initialization.
<a href="#">Temperature_Initialization</a>	Data for the temperature field initialization.
<a href="#">Species_Initialization</a>	Data for the species mass fraction initialization.
<a href="#">Two_Fluids_Initialization</a>	Data for the density field initialization in the special case of immiscible fluids.
<b>Forces applied to the fluid</b>	
<a href="#">Gravity</a>	Data to define the direction and the magnitude of the gravity.
<a href="#">External_Force</a>	To define a bulk force on the flow.
<b>Domain configuration (geometries, domain decomposition (if MPI parallelization) &amp; boundary conditions)</b>	
<a href="#">Domain_Features</a>	Data on the geometry, the size of the domain and the mesh size as well as the domain decomposition layout (for parallel simulations only).
<a href="#">Polyhedral_Immersed_Bodies</a>	Data setup for building every polyhedral solid objects.
<a href="#">Cylindrical_Immersed_Bodies</a>	Data setup for building every cylindrical solid objects.
<a href="#">Heat_Wall_Boundary_Condition_Setup</a>	Data setup on the wall boundary conditions for the heat flux.
<a href="#">Velocity_Wall_Boundary_Condition_Setup</a>	Data setup on the wall boundary conditions for the velocity.
<a href="#">Species_Wall_Boundary_Condition_Setup</a>	Data setup on the wall boundary conditions for the mass flux of species.
<a href="#">Inlet_Boundary_Conditions</a>	Data setup used to define inflow boundary conditions.
<a href="#">Outlet_Boundary_Conditions</a>	Data setup used to define outflow boundary conditions.
<a href="#">Border_Domain_Boundary_Conditions</a>	Data setup used to define boundary conditions at the ends of the domain.
<b>Large Eddy Simulation models</b>	
<a href="#">SGS_Model</a>	Data related to Large Eddy Simulation models that are available.
<b>Wall and Gas Radiation modeling</b>	
<a href="#">Radiative_Heat_Transfer_DOM</a>	Data related to the Discrete Ordinates Method and SLW gas model.
<b>Simulation management (choice of numerical methods, time parameters of simulation, recording rates of data, etc)</b>	
<a href="#">Numerical_Methods (old version)</a>	Data setup used to select the numerical methods used for solving the discretized equations.

<b>Fluid Properties</b>	
<a href="#">Numerical_Methods (new version)</a>	Data setup used to select the numerical methods used for solving the discretized equations.
<a href="#">HomeData_PoissonSolver</a>	Data for solving Poisson's equation with the "homemade" iterative methods (coupled with the namelist Numerical_Methods (new version)).
<a href="#">HypreData_PoissonSolver</a>	Data for solving Poisson's equation with the HYPRE library tools (coupled with the namelist Numerical_Methods (new version)).
<a href="#">Level_Set_Method</a>	Data setup for the level set method (immiscible fluids).
<a href="#">Simulation_Management</a>	Data setup used to set the time parameters of the simulation (related to the computation and the data acquisition).
<b>Data acquisition</b>	
<a href="#">Probe_Quantities_Enabled</a>	Define physical quantities that will be recorded by probes during the simulation to build time series.
<a href="#">Probe_Location</a>	Coordinates of probes used to record time series of physical quantities.
<a href="#">Instantaneous_Fields_Listing</a>	List of physical quantities whose instantaneous fields will be recorded.
<a href="#">Statistical_Fields_Listing</a>	List of statistical fields to record.
<a href="#">Slices_Recording_Setup</a>	List of slices on which data fields are recorded.
<a href="#">SpaceAveragedSnapshots_Dataset</a>	List of space-averaged fields along a specific direction.
<a href="#">Field_Recording_Setup</a>	Regroup some parameters about data acquisition such as the precision (single or double) on the result fields, etc ...

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From:

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Last update: **2019/12/25 14:35**

