Single Cavity Model

Running Single Instance of Cavitation

1. Specify Input Conditions in the Input.xlsx file
2. Type ‘SCM\_MainProgram.m’ to run the code
3. To copy specific variables to the clipboard, modify ‘SCM\_Postprocess.m’ file

Running Single Instance of Cavitation

1. Specify Input Conditions in the Input.xlsx file
2. Specify range for manipulated variable in the ‘Loop\_Run.m’ file (by default set to pressure amplitude)
3. Type ‘Loop\_Run.m’ to the code

List of Files

|  |  |
| --- | --- |
| **Name** | **Description** |
| SCM\_MainProgram.m | Main Driver program for running the Single Cavity Model |
| InputforSCM.xlsx | Main input file for the Single Cavity Model |
| SCM\_ReadData.m | Read data from the Excel file ‘Input.xslx’ for running the Single Cavity Model |
| SCM\_estimatederivedprop.m | Calculate derived variables from given data required for the solver for running the Single Cavity Model |
| SCM\_event\_function.m | Event function to stop solver at cavitation collapse conditions (defined as then the cavity attains a minimum size) |
| SCM\_ODEsolvefunc.m | Derivative specification for solution of the single cavity dynamics equations |
| SCM\_Cavpressurefunc.m | Auxiliary function for calculating the driving pressure as a function of time |
| SCM\_Cvcalc.m | Auxiliary function for calculating the instantaneous value for the molecular specific heat at constant volume for the calculation of internal energy (Cv) |
| SCM\_Psicalc.m | Auxiliary function for calculating the instantaneous value for the correction to the mixture specific heat at constant volume |
| SCM\_Uifunc.m | (Redundant) Auxiliary function for calculating the instantaneous value for the mixture internal energy |
| SCM\_Postprocess.m | Post processing of the simulation results for analysis for running the Single Cavity Model |
| Loop\_Run.m | Main Driver program for running the sensitivity analysis of a manipulated variable |
| Loop\_ReadData.m | Read data from the Excel file ‘Input.xslx’ for running the sensitivity analysis of a manipulated variable |
| Loop\_estimatederivedprop.m | Calculate derived variables from given data required for the solver for running the sensitivity analysis of a manipulated variable |
| Loop\_Postprocess.m | Post processing of the simulation results for running the sensitivity analysis of a manipulated variable |

List of Variables

|  |  |
| --- | --- |
| **Name** | **Description** |
| time | Simulation time span |
| init | Initial conditions to the solver |
| options | Solver options |
| k | Boltzmann’s constant |
| Nav | Avogadro’s number |
| cavpressureparam1 | Pressure at infinity |
| cavpressureparam2 | Pressure amplitude |
| cavpressureparam3 | Driving frequency |
| rholiq | Density of liquid |
| nuliq | Viscosity of liquid |
| cwliq | Speed of sound in liquid |
| sigmaliq | Surface tension in liquid |
| Dij | Diffusion coefficient matrix |
| lambda | Thermal conductivity |
| theta | Vibrational temperature matrix |
| fi | Degrees of freedom (translational + rotational) |
| Pv | Vapour pressure |
| Tinf | Temperature at infinity |
| VdW\_a\_i | Van der Waals EOS pressure correction factors |
| VdW\_b\_i | Van der Waals EOS volume correction factors |
| ncomp | Number of components |
| m | Molecular weight of components |
| eta | Parameter for calculation of thermal conductivity |
| paramincludekm | Include Keller-Miksis Correction |
| paramincludediff | Include diffusion of species (not active) |
| paramincludetemp | Include energy balance |
| paramincludecvcorr | Include *Cv* correction |
| paramincludeucorr | Include internal energy correction (redundant) |
| paramincludediffw | Include diffusion of water |
| paramincludepsicorr | Include correction of mixture *Cv* calculation |
| cavparam | Switch between AC and HC |
| paramterminate | Terminate simulation at first collapse |
| abstol | Absolute tolerance |
| epsibyk | Lennard Jones’ constant matrix |