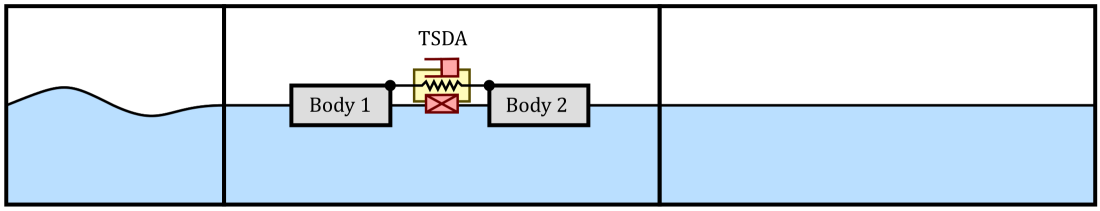
Tutorial:

Connected Bodies in Proteus using the Chrono TSDA Class

Developed for proteus 1.7.5 and chrono 5.0



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Learning outcomes

The reader will learn:

How to use it:

- how to use the ChLinkTSDA class to connect bodies in proteus
- how to use proteus logging functions to record spring forces, velocities, and lengths
- how to use some python scripts for post processing the information from these logs
- basic post-processing of the simulation results in paraview

The theory of it:

- the theory behind the ChLinkTSDA class

Prerequisites

The reader is expected to have/know the following:

- Proteus 1.7.5+ compiled with chrono 5.0 installed in the proteus stack
- any version of Paraview installed
- the proteus tutorial folder downloaded on your PC (or access to git, so that you can git clone the folder from github)
- updated chrono logging definitions in the proteus/mbd/CouplingFSI.pyx file
- How to run basic proteus simulations
- How to setup simple floating body simulations in proteus

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Chapter 1

Tutorial ChLinkTSDA

1.1 Introduction

This tutorial describes how to pre-process, run and post-process a case involving compressible reacting flow with Lagrangian evaporating particles in a three-dimensional domain. It also describes how to copy the solver, copy an evaporation model and how to add a second material to the discrete particles.

The geometry consists of a block filled with air, with a 0.01x0.01 meter base and a length of 0.1 meter (figure 1.1). An injector is centrally placed on the top boundary where n-Heptane (C_7H_{16}) is injected. When the discrete droplets enter the domain they evaporate and combustion takes place in the gas phase. There are several gas phase reaction schemes supplied with the case ranging from a reaction scheme with 5 species and one reaction up to a reaction scheme involving ∼300 reactions and 56 species.

Figure 1.1: Geometry of the dieseFoam tutorial case.

1.2 Pre-processing