



- Task 1: Run Nalu/reg_tests/test_files/dgNonConformalThreeBlade
 - a. Modify the input file to increase termination_step_count to ~ 500
 - b. Visualize the flow field with displacements activated and provide a single image at the final step count
 - c. How does modification of the blade rotation (ω) affect the time step?
 - d. Report any modifications that resulted in catastrophic behavior, i.e., the simulation diverged. Document how you caused the simulation to diverge.
- Task 2: Run Nalu/reg_tests/test_files/fluidsPmrChtPeriodic
 - a. Modify the input file to increase termination_step_count to ~ 500
 - b. Visualize the temperature, velocity, and radiative file (your choice) and provide a single image at the final step count
 - c. Modify the gravity constant such that the Rayleigh number is doubled and trippled. Report any findings

Homework #1 Task 3: Specified Pressure Drop Laminar Pipe Flow:



- Location: <https://github.com/spdmain/Present/tree/master/stanfordMe469/hw/one>
- You will modify the input file to provide the density, viscosity and pressure drop to achieve $Re^\tau = 10$ and report on the differences between the simulation and analytical centerline velocity
- Specifications:
 - $Re^\tau = 10$
 - Pipe diameter, $D = 0.01$ m
 - Pipe Length, $L = 0.2$ m
- a. Perform a global momentum balance to determine the pressure gradient. dp/dz as a function of the wall shear stress, τ_w
- b. Given $Re^\tau = \rho u^\tau D / \mu$ and $\tau_w = \rho D (u^\tau)^2$, where u^τ is the wall friction velocity, report the required pressure gradient required for the desired $Re^\tau = 10$
- c. Modify the input file to specify the proper density, viscosity and open pressure specification (look for the pressure specification under `open_user_data`)
- d. Run both the Hex8 and Tet4 input file and compare the simulation centerline velocity to the analytical result (feel free to derive or simply report the functional form)
- e. Capture any findings between the Hex8 and Tet4 simulation, e.g., simulation time, velocity component qualitative differences, convergence, etc.

