INTRODUCTION TO FLUID FLOW MODELING USING ANSYS FLUENT

MEG 222 CFD ASSIGNMENT 1 INSTRUCTIONS

SUBMISSION DATE: MAY 31, 2024

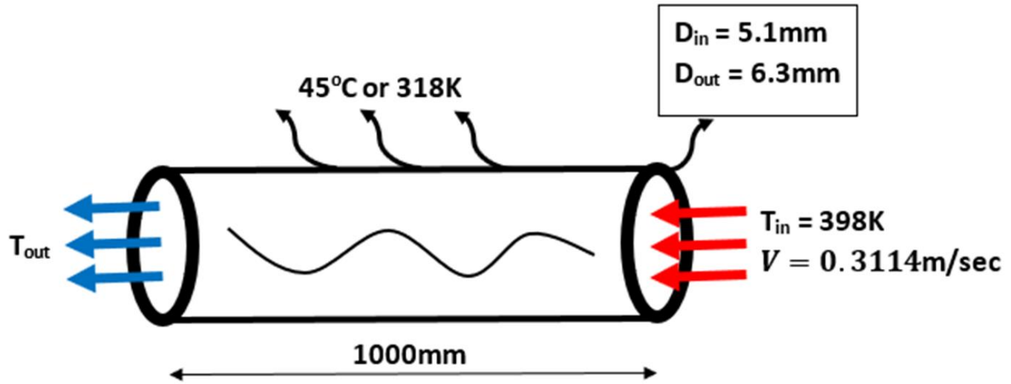
FLUID FLOW MODELING & ANALYSIS

In this first CFD assignment, students will model and analyze the flow of three different hot fluids through a circular tube and compare results of their outlet temperatures

- **First task is to create the geometry of the circular tube**
- **Second task is to discretize the geometry using a structured mesh**
- **Third task is to input all flow conditions and properties in the solver**
- **Fourth task is to compare the results of the outlet temperature of the three different fluids**

FLUID FLOW IN A CIRCULAR TUBE

- Three-dimensional model
- Newtonian Fluid
- Steady state
- Pressure base solver
- Viscous Laminar model
- Energy transfer
- Water and Propylene Glycol
- Constant temperature on tube wall



MATERIAL PROPERTIES OF FLUID

S/N	Properties	Pure Water	Water + 30% Propylene Glycol	Water + 50% Propylene Glycol
1	Density (Kg/m3)	998	1029	1044
2	Specific Heat Capacity (J/Kg K)	4184	3848	3532
3	Thermal Conductivity (w/m K)	0.6	0.431	0.341
4	Viscosity (Kg/m-s)	0.001003	0.00306	0.00662

Ansys

MATERIAL PROPERTIES OF PIPE

S/N	Properties	Copper (Cu)
1	Density (Kg/m3)	8978
2	Specific Heat Capacity (J/Kg K)	381
3	Thermal Conductivity (w/m K)	401

GENERAL WORKFLOW

DEFINE THE PROBLEM

- What results are you looking for?
- Determine the appropriate flow regime
- Determine the modeling approach

PRE-PROCESSING

- Develop a model (CAD modeling)
- Choose appropriate meshing option

SOLVER

- Select appropriate solver
- Select appropriate flow model
- Input fluid material properties
- Define the cell zone conditions
- Input the right boundary conditions,
- Choose appropriate solution method
- Run calculations

POST-PROCESSING

Interprete results of different flow properties