ES 211 Thermodynamics Project

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1 Objective of the Project

To write a function in MATLAB that can be used to extract all the state properties of CO2, given two independent state properties as input.

- **Substance:** CO_2

- **Combination:** TV, PV, PS

2 Requirements

You would need MATLAB installed on your computer to run the program. Along with MATLAB, you would need the three data sheets with the same name as given.

3 Usage

1. There are a total of three functions for three sets of input properties (as mentioned above). These are: **"SetProperties_CO2_PS.m"**, "**SetProperties_CO2_PV.m**" and "**SetProperties_CO2_TV.m**".

2. The user has to keep the function files and the data sheets in the same folder.

3. To get an output from each function, the user needs to enter the following command in the command window:

   - [p, v, T, u, h, s, x] = SetProperties_CO2_PS(p,s)
   - [p, v, T, u, h, s, x] = SetProperties_CO2_PV(p,v)
   - [p, v, T, u, h, s, x] = SetProperties_CO2_TV(T,v)

   where, the properties in the parenthesis on the right hand side have to be provided by the user.

4. The **output** would be a vector in the following format: [p; v; T; u; h; s; x]

5. The **units** of the properties, for both input and output are:

   - Specific internal energy, **u** J/kg
   - Specific enthalpy, **h** J/kg
   - Specific entropy, **s** J/kg-K
   - Specific volume, **v** m^3/kg
   - Vapor fraction (or quality), **x** dimensionless

- Temperature, **T**, K
- Pressure, **P**, Pa

6. The function works only for the following **ranges of input values** (as provided):

   - Temperature range: 220-300 K.
   - Pressure range: 600000-7100000 Pa.
   - Specific volume range: less than 0.113 m^3/kg
   - Specific entropy range: less than 4691 J/kg-K
   - As data for **subcooled liquid** was not available, the default values of all outputs are set 0 in this case.

4   Authors and acknowledgments