

Homework #2

MEMS 0051 - Introduction to Thermodynamics

Assigned May 15th, 2018
Due: May 21st, 2018

Problem #1

Use the thermodynamic steam tables to determine the phase (compressed/subcooled liquid, saturated liquid, saturated water, saturated vapor, superheated vapor) of water at the following conditions. In addition to identifying the phase, create one T - ν and one P - ν diagram and plot each item with a dot, indicating its phase as well. To create the T - ν and P - ν diagrams, plot temperature versus saturated liquid and vapor specific volume and pressure versus saturated liquid specific volume in Matlab. Ensure the x- and y-axis scales are appropriate (logarithmic and linear, respectively). Include axes labels, units and chart title.

- (a) 100 °C, 101.3 [kPa]
- (b) 180 °C, 2,000 [kPa]
- (c) 160 °C, 400 [kPa]
- (d) 400 °C, 200 [kPa]
- (e) 133.5 °C, 300 [kPa]
- (f) 100 °C, 800 [kPa]
- (g) 100 [kPa], 1.500 [m³/kg]
- (h) 100 [kPa], 2.500 [m³/kg]
- (i) 500 [kPa], 0.001070 [m³/kg]
- (j) 50 °C, 5.0 [m³/kg]
- (k) 150 °C, 1.5 [m³/kg]
- (l) 100 °C, 0.001043 [m³/kg]

Problem #2

Determine the specific volume of the following states of water. Create one T - ν and one P - ν diagram and plot each item with a dot, indicating its phase as well

- (a) 320 °C, 200 [kPa]
- (b) 105 °C, 2,000 [kPa]
- (c) 60 °C, 200 [kPa]
- (d) Saturated liquid at 400 [kPa]
- (e) Saturated vapor at 125 °C