Purdue University
School of Nuclear Engineering
NUCL 355 - Nuclear Thermal-Hydraulics Laboratory

Prelab Problem
Experiment 13: Blowdown Experiment

Consider a tank containing water at pressure of 475 kPa and saturation temperature of 150 ^{0}C. The tank total volume is 3.0 m^3 and the initial water volume is 2 m^3. If the water is discharged to atmosphere from an orifice disc of diameter 5.04 cm, calculate the discharge rate as function of time. Plot discharge rate (kg/s) and tank pressure as function of time.
(Hint: Use the paper attached with your hand out to calculate the single phase saturated liquid critical flow rate equation. Using small time steps calculate for each time step the discharge rate and loss of the fluid from the tank. Then using the loss of the liquid volume from tank calculate the pressure in the tank using ideal has law for each time step and continue until the flow becomes subcritical)