Systems and Control - AE 315, 231

Week 3: Assignment No. 3 (Due Date: Sunday 17 September 11:59 p.m.)

King Fahd University for Petroleum and Minerals - Aerospace Dept.

September 12, 2023

Assignment Instructions

1. Attempt all the presented questions for partial grades.
2. Deliverables:
   (a) The **MATLAB script** (.m) file.
   (b) A **report** showing your work (.pdf). Please stick to the formal report format (cover page, table of contents, introduction, ...)
   (c) Name your files according to this format: `AE_315__Your_Name__HW_#.(pdf/m)`

1 Fluid system

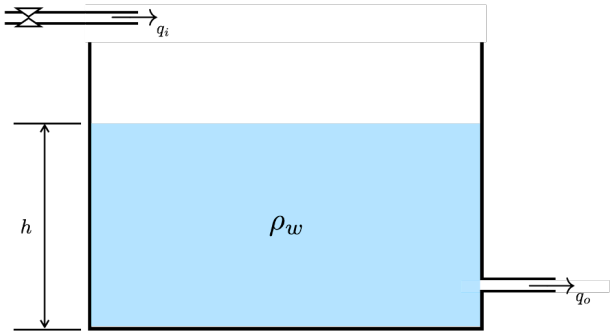

Figure 1: Fluid system

1. (3 points) Derive the equation of motion governing the system shown in figure 1.
2. (3 points) Write a MATLAB code to simulate the equations found in 1. Use $A = 3$, $R_f = 0.5$, with $h_0 = 0$ m and assume the following scenarios for the deriving forces:
   (a) $q_i = 0$
   (b) $q_i = c$; where c is the last two digits of your ID number e.g. 2020168xx. If your last two digits are zeros, choose 25.
3. (1 point) Compare your findings with plots for each scenario and report all of your findings, code, and derivations in a neat way.
4. (3 points) Model and simulate the system using SIMULINK and show the plots in a neat way.