PRACTICAL FILE

MODELING AND SIMULATION LAB

(CS 603)

BE CSE 6TH SEM

(GROUP-4)

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Practical 9

Aim

Simulation of a Water Tank Filling and Draining System over the time.

Introduction to Simulation of a Water Tank Filling and Draining System: This project focuses on simulating a water tank system that undergoes both filling and draining processes over time. It aims to provide a simple yet effective representation of how water levels vary based on inflow and outflow rates.

Objective:
The main goal of this simulation is to understand the dynamic behaviour of water levels in a tank. By changing parameters like flow rate and time intervals, we can observe how the tank responds to different situations.

Applications:
Such simulations are widely used in real-life applications like water resource management, automatic tank filling systems, industrial process control, and smart irrigation systems. It helps in designing systems that require efficient water level monitoring.

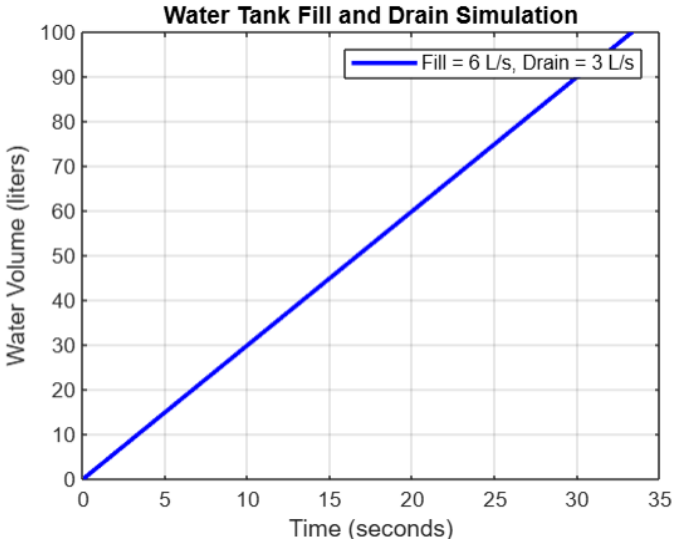
Moreover, this kind of model has practical applications in various fields, including agriculture (for automated irrigation), civil engineering (for water supply planning), and smart home systems (for efficient water usage). It can also serve as an educational tool for students learning about control systems, fluid dynamics, or environmental science.

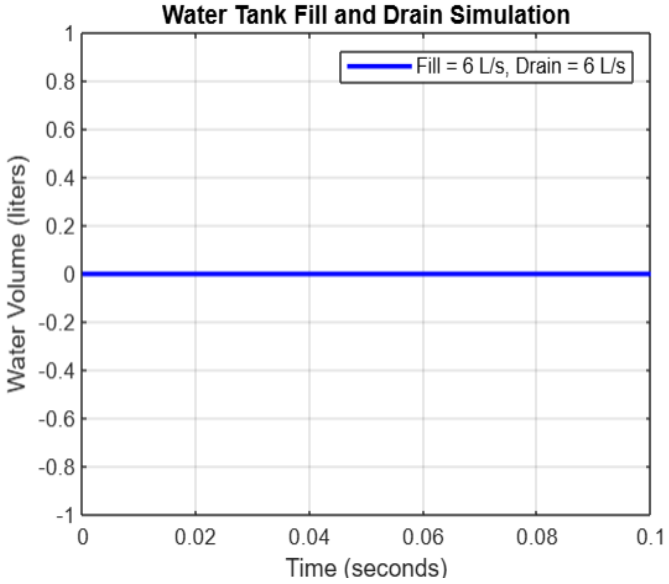
The simulation output is typically presented in the form of visual graphs or animations that show the tank's water level over time. This makes it easier to analyse trends and detect any inconsistencies or inefficiencies in the system.

Code for Implementation of Simulating Water Tank Filling and Draining

```
max_capacity = 100;
initial_volume = 0;
dt = 0.1;
filling_speed = 6;
draining_speed = 3;
time = 0;
volume = initial_volume;
i = 1;
while true
    i = i + 1;
    time(i) = time(i-1) + dt;
    delta_volume = (filling_speed - draining_speed) * dt;
    volume(i) = volume(i-1) + delta_volume;
    if volume(i) >= max_capacity
        volume(i) = max_capacity;
        break;
    elseif volume(i) <= 0
        volume(i) = 0;
        break;
    end
end
figure;
plot(time, volume, 'b-', 'LineWidth', 2);
xlabel('Time (seconds)');
ylabel('Water Volume (liters)');
title('Water Tank Fill and Drain Simulation');
legend(['Fill = ' num2str(filling_speed) ' L/s, Drain = ' num2str(draining_speed) ' L/s']);
grid on;
```

Output


Water Tank Fill and Drain Simulation
Fill = 6 L/s, Drain = 3 L/s
Water Volume (liters)
Time (seconds)
0
10
20
30
40
50
60
70
80
90
100
0
5
10
15
20
25
30
35


Water Tank Fill and Drain Simulation
Fill = 6 L/s, Drain = 6 L/s
Water Volume (liters)
Time (seconds)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
0
0.02
0.04
0.06
0.08
0.1