

Engineering Software

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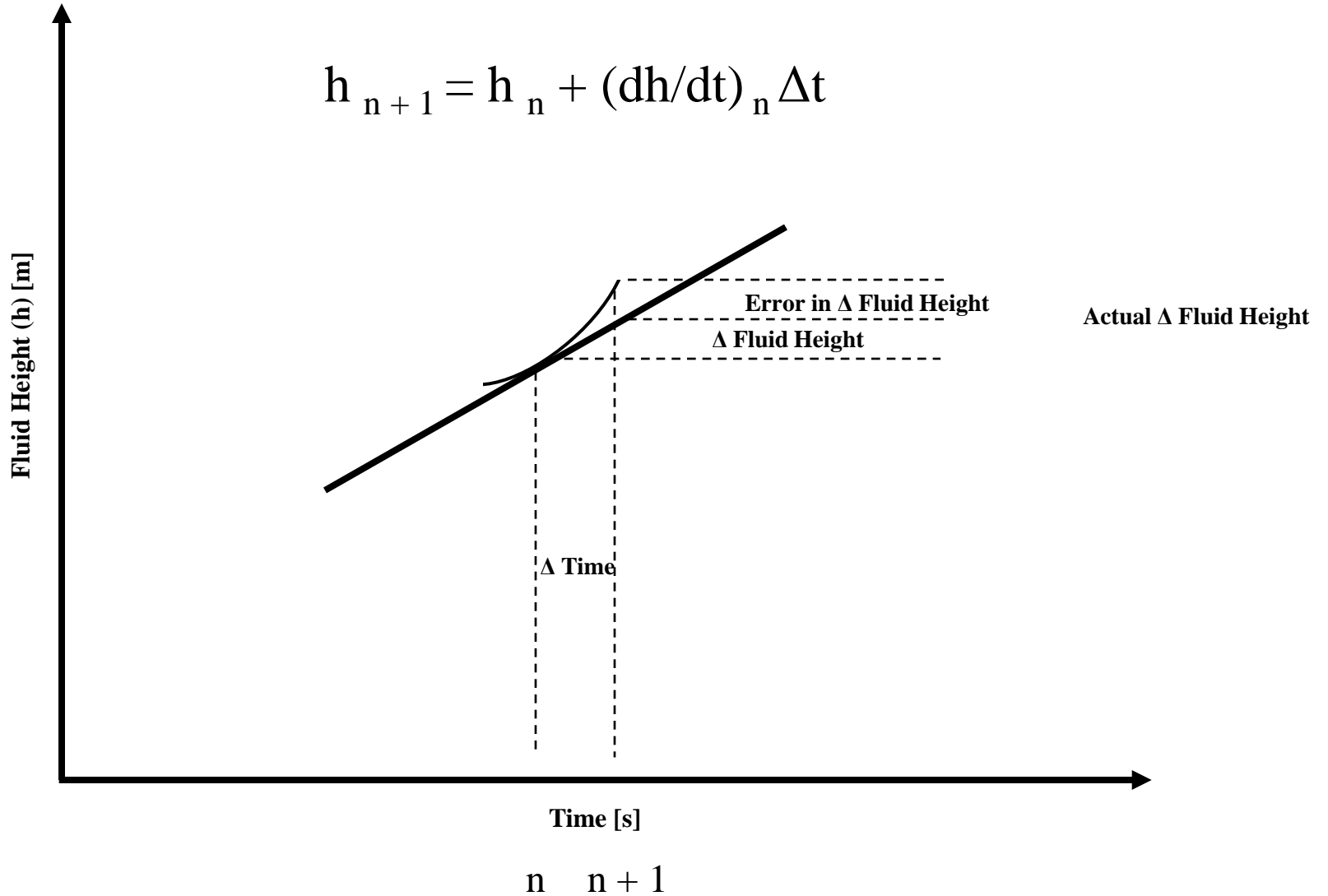
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Engineering Simulation

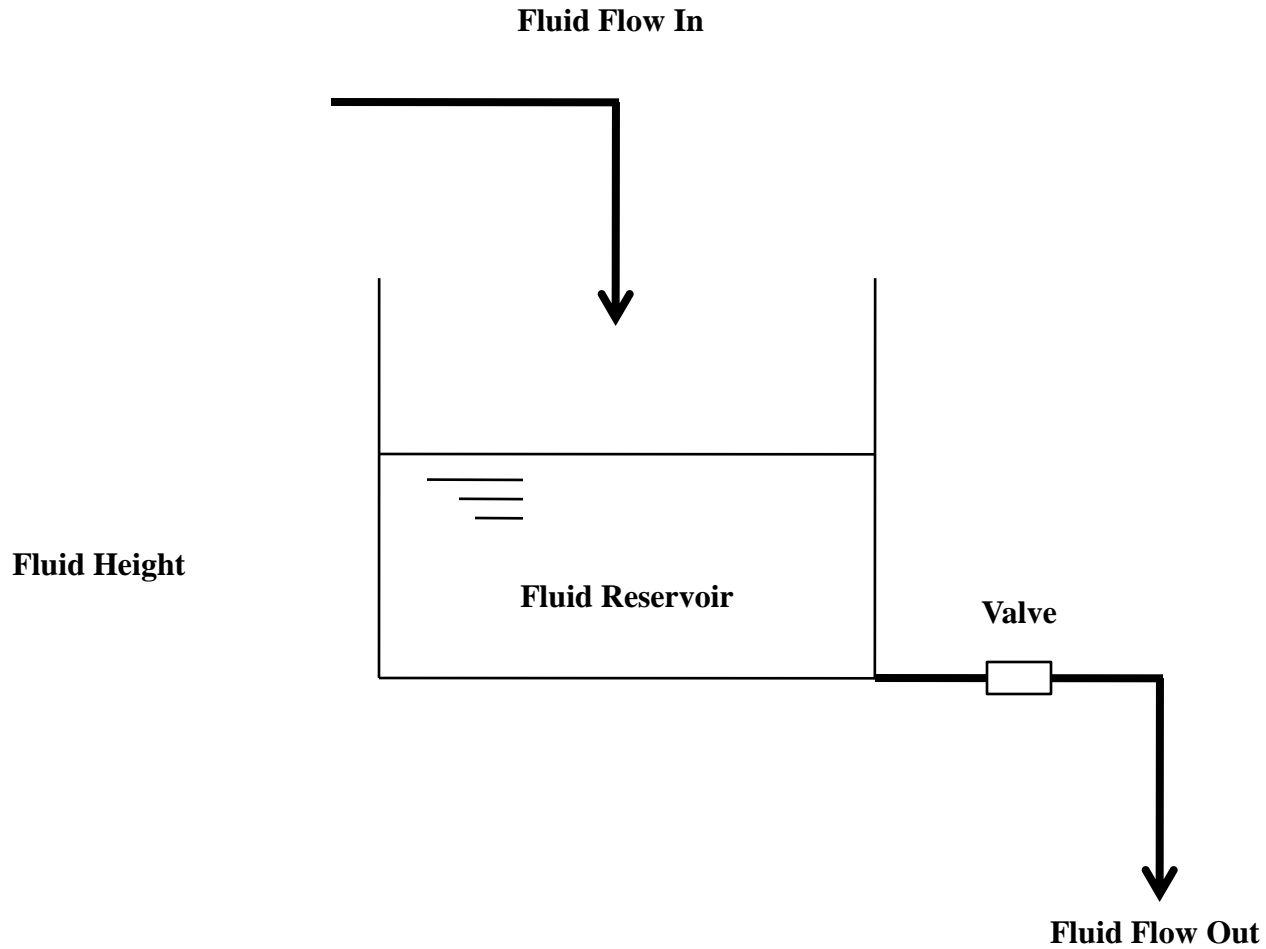
Here are some of the basic engineering simulation plots when dealing with a fluid reservoir.

Euler Integration

$$h_{n+1} = h_n + (dh/dt)_n \Delta t$$



Reservoir Fluid Height Schematic Layout



Reservoir Fluid Height

$$m_{in} - m_{out} = \rho A (dh/dt)$$

$$m_{out} = \rho v a$$

$$v = (2gh)^{1/2}$$

$$(dh/dt)_n = (m_{in} - (2gh_n)^{1/2})/\rho A$$

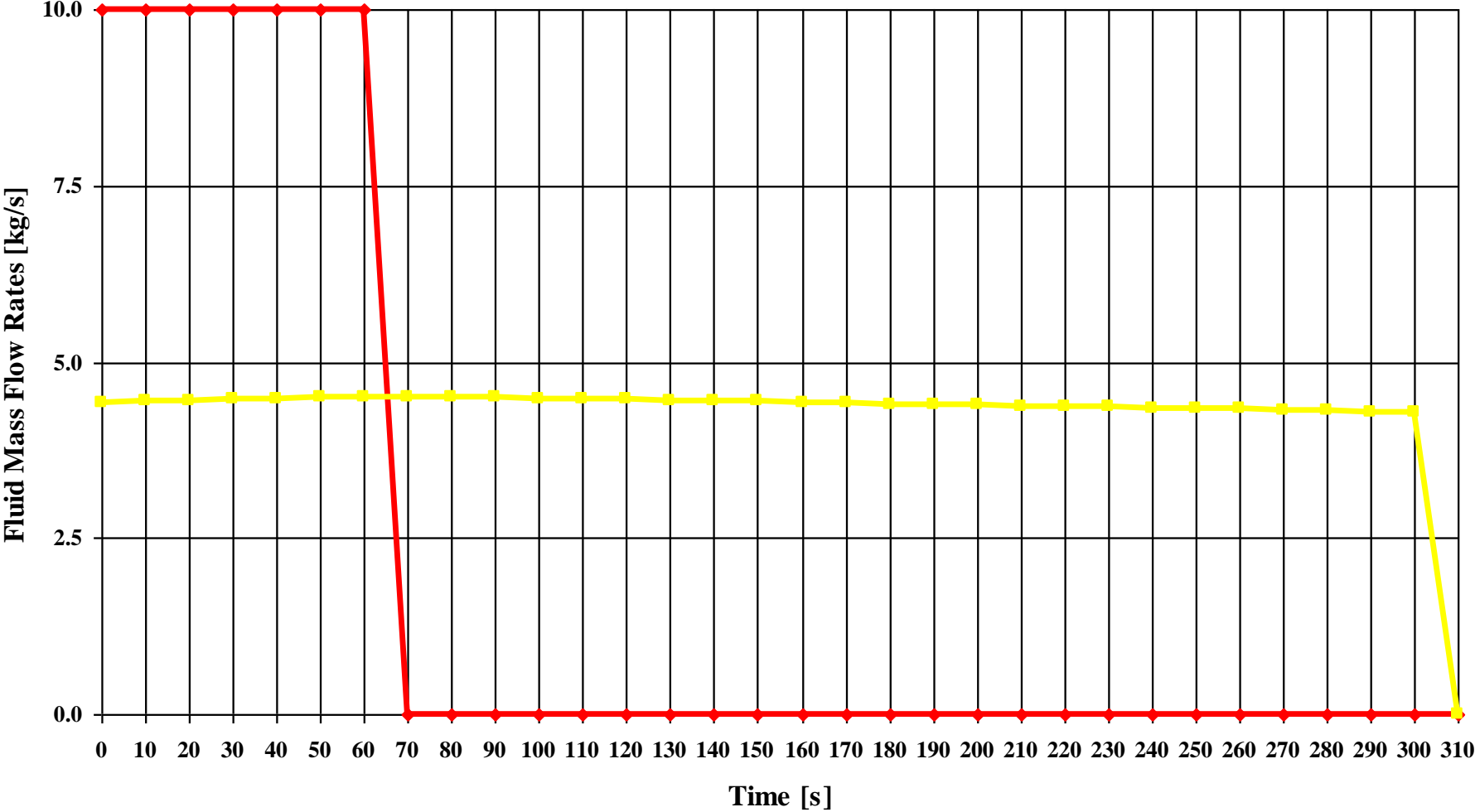
$$h_{n+1} = h_n + (dh/dt)_n \Delta t$$

Simulation Results

Reservoir fluid inlet mass flow rate [kg/s]: 10
Reservoir fluid density [kg/m³]: 1000
Reservoir fluid outlet valve cross sectional area [m²]: 0.001
Reservoir initial fluid height level [m]: 1
Reservoir cross sectional area [m²]: 10
Simulation integration time [s]: 10
Reservoir fluid inlet mass flow rate cut off time [min]: 1
Reservoir fluid outlet mass flow rate cut off time [min]: 5
Gravity [m/s²]: 9.81

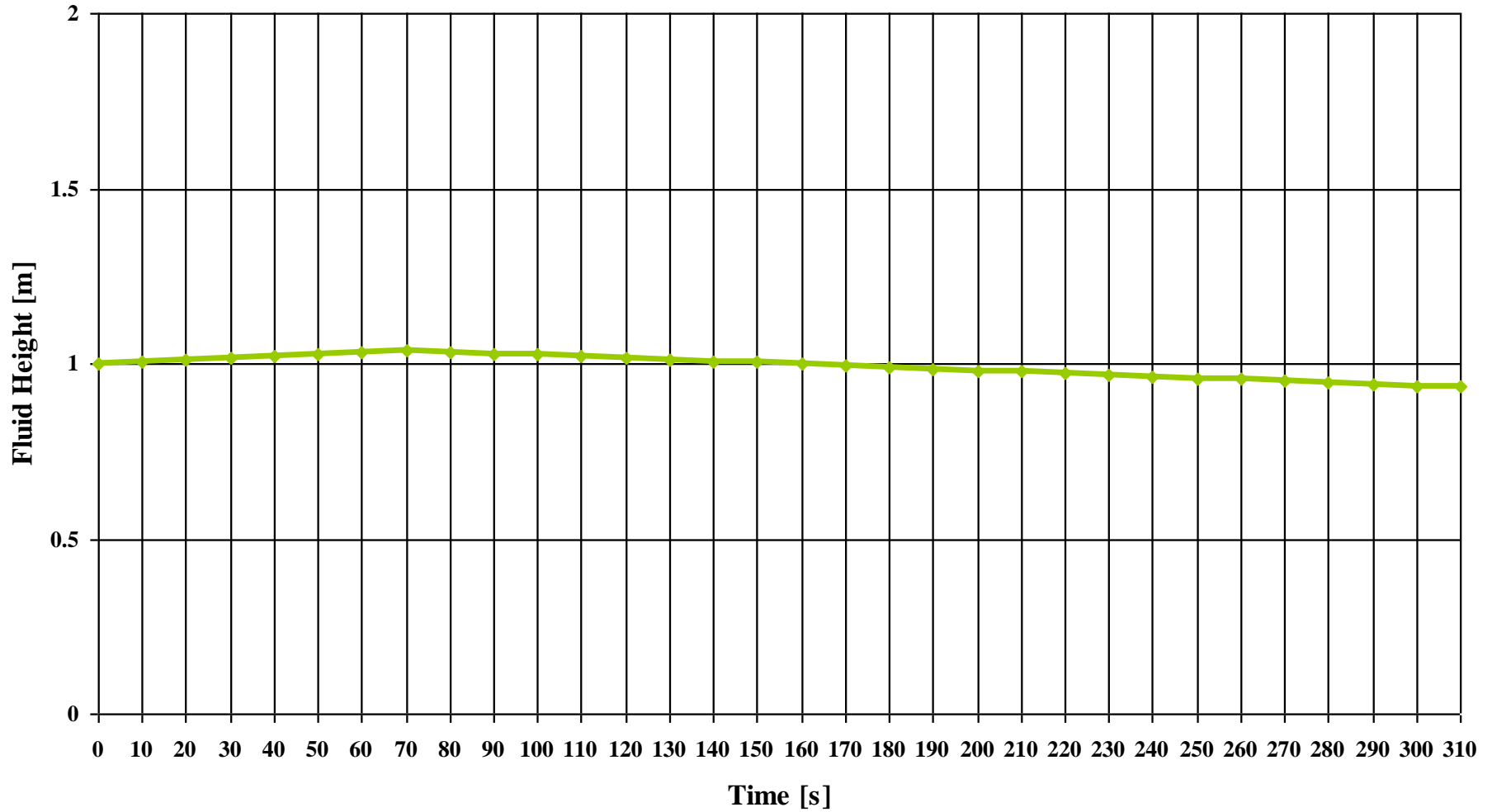
Step [/]	Time [s]	Flow In [kg/s]	Height [m]	Flow Out [kg/s]
1	0	10	1	4.42945
2	10	10	1.00557	4.44177
3	20	10	1.01113	4.45403
4	30	10	1.01667	4.46622
5	40	10	1.02221	4.47836
6	50	10	1.02773	4.49044
7	60	10	1.03324	4.50246
8	70	0	1.03874	4.51442
9	80	0	1.03422	4.5046
10	90	0	1.02972	4.49478
11	100	0	1.02522	4.48496
12	110	0	1.02074	4.47514
13	120	0	1.01626	4.46532
14	130	0	1.0118	4.4555
15	140	0	1.00734	4.44568
16	150	0	1.0029	4.43586
17	160	0	0.998461	4.42604
18	170	0	0.994035	4.41622
19	180	0	0.989619	4.4064
20	190	0	0.985213	4.39657
21	200	0	0.980816	4.38675
22	210	0	0.976429	4.37693
23	220	0	0.972052	4.36711
24	230	0	0.967685	4.35729
25	240	0	0.963328	4.34747
26	250	0	0.95898	4.33765
27	260	0	0.954643	4.32783
28	270	0	0.950315	4.31801
29	280	0	0.945997	4.30819
30	290	0	0.941689	4.29836
31	300	0	0.93739	4.28854
32	310	0	0.933102	0

Fluid Mass Flow Rates vs Time



Flow In Flow Out

Fluid Height vs Time



◆ Height