Introduction to E1DISP

- Lake Examples
- River Examples

Lake Example

Example 2.1

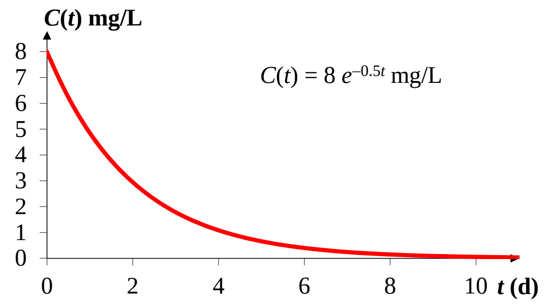
Example 2.1

Consider Lake Harapan in USM with a surface area of 10000 m^2 and a mean depth of 1 m. This small lake has a uniformly mixed content containing 80000 g of pollutant that decays at the rate of 0.5 d^{-1}. The concentration of the pollutant in the lake at time t is denoted by $C(t)$.

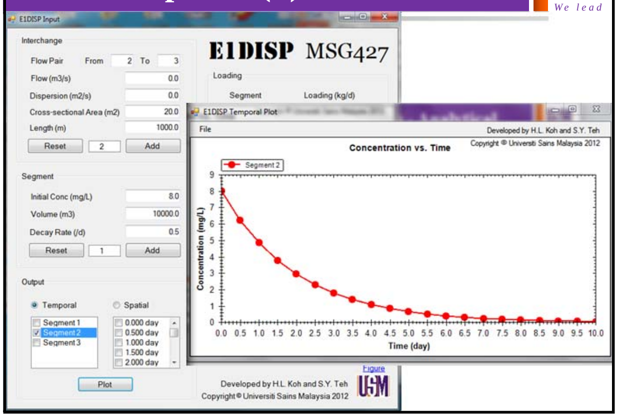
a) Form and solve the differential equation for $C(t)$ in mg/L.

b) Sketch the graph of $C(t)$ when $t \to \infty$.

Example 2.1(b) - Analytical



Example 2.1(b) – E1DISP



River Examples

Examples 3.1 – 3.3

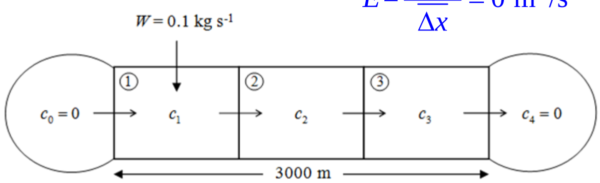
Example 3.1 - Summary

A = 20 m^2 L = 3000 m u = 0.1 m/s

E = 0.0 m^2/s Δx = 1000 m W = 0.1 kg/s

k = 10^{-4} s^{-1} $Q = uA = 2\ \text{m}^3/\text{s}$

$$\bar{E} = \frac{E \cdot A}{\Delta x} = 0\ \text{m}^3/\text{s}$$



Example 3.1 – Analytical Solution

$$c_1 = 0.025\ \text{kg/m}^3 = 25\ \text{mg/L}$$

$$c_2 = 0.0125\ \text{kg/m}^3 = 12.5\ \text{mg/L}$$

$$c_3 = 0.00625\ \text{kg/m}^3 = 6.25\ \text{mg/L}$$

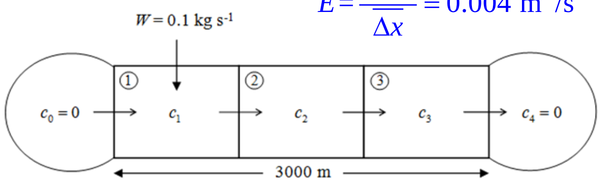
Example 3.2 - Summary

A = 20 m^2 L = 3000 m u = 0.1 m/s

E = 0.2 m^2/s Δx = 1000 m W = 0.1 kg/s

k = 10^{-4} s^{-1} $Q = uA = 2\ \text{m}^3/\text{s}$

$$\bar{E} = \frac{E \cdot A}{\Delta x} = 0.004\ \text{m}^3/\text{s}$$



Example 3.2 – Analytical Solution

$$c_1 = 0.02496\ \text{kg/m}^3 \quad \text{or} \quad c_1 = 24.96\ \text{mg/L}$$

$$c_2 = 0.01249\ \text{kg/m}^3 \quad \text{or} \quad c_2 = 12.49\ \text{mg/L}$$

$$c_3 = 0.00624\ \text{kg/m}^3 \quad \text{or} \quad c_3 = 6.24\ \text{mg/L}$$

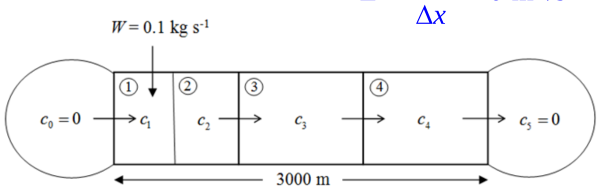
Example 3.3 - Summary

A = 20 m^2 L = 3000 m u = 0.1 m/s

E = 0.0 m^2/s Δx = 1000 m W = 0.1 kg/s

k = 10^{-4} s^{-1} $Q = uA = 2\ \text{m}^3/\text{s}$

$$\bar{E} = \frac{E \cdot A}{\Delta x} = 0\ \text{m}^3/\text{s}$$



Example 3.3 – Analytical Solution

$$c_1 = 0.033\ \text{kg/m}^3 \quad \text{or} \quad c_1 = 33\ \text{mg/L}$$

$$c_2 = 0.022\ \text{kg/m}^3 \quad \text{or} \quad c_2 = 22\ \text{mg/L}$$

$$c_3 = 0.011\ \text{kg/m}^3 \quad \text{or} \quad c_3 = 11\ \text{mg/L}$$

$$c_4 = 0.0056\ \text{kg/m}^3 \quad \text{or} \quad c_3 = 5.6\ \text{mg/L}$$

Thank you

Presented by
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