

Matlab program for CSTR simulation

Ordinary differential equation (ODE) setup

* ODE for A

$$\frac{dC_{A1}}{dt} = \frac{F}{V} (C_{A0} - C_{A1}) - kC_{A1}$$

* ODE for B

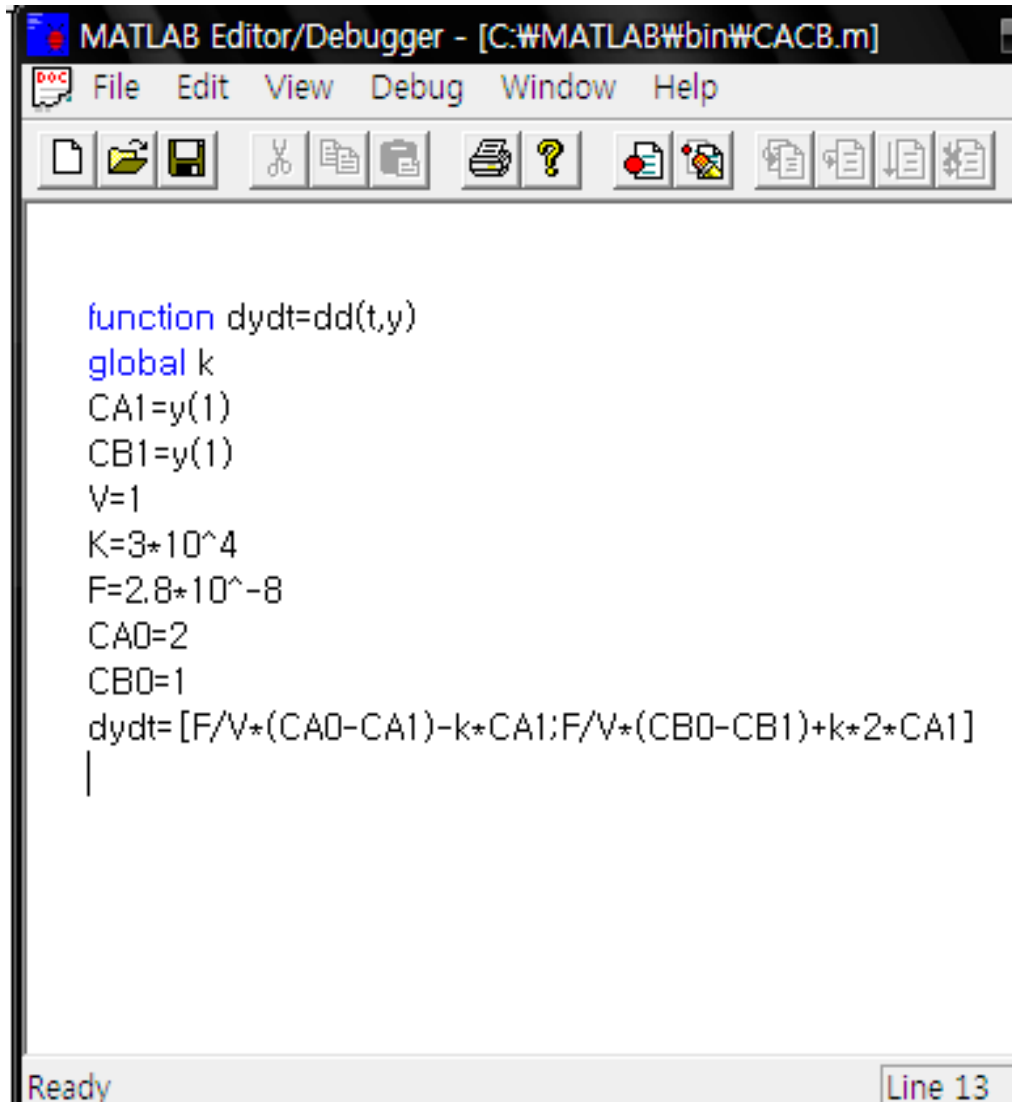
$$\frac{dC_{B1}}{dt} = \frac{F}{V} (C_{B0} - C_{B1}) + 2kC_{A1}$$

* Initial conditions

$$V = 1\text{L} = 10^{-3}\text{m}^3, \quad F = 2\text{kg/m}^3, \quad k = 3 \times 10^{-4}/\text{s}$$

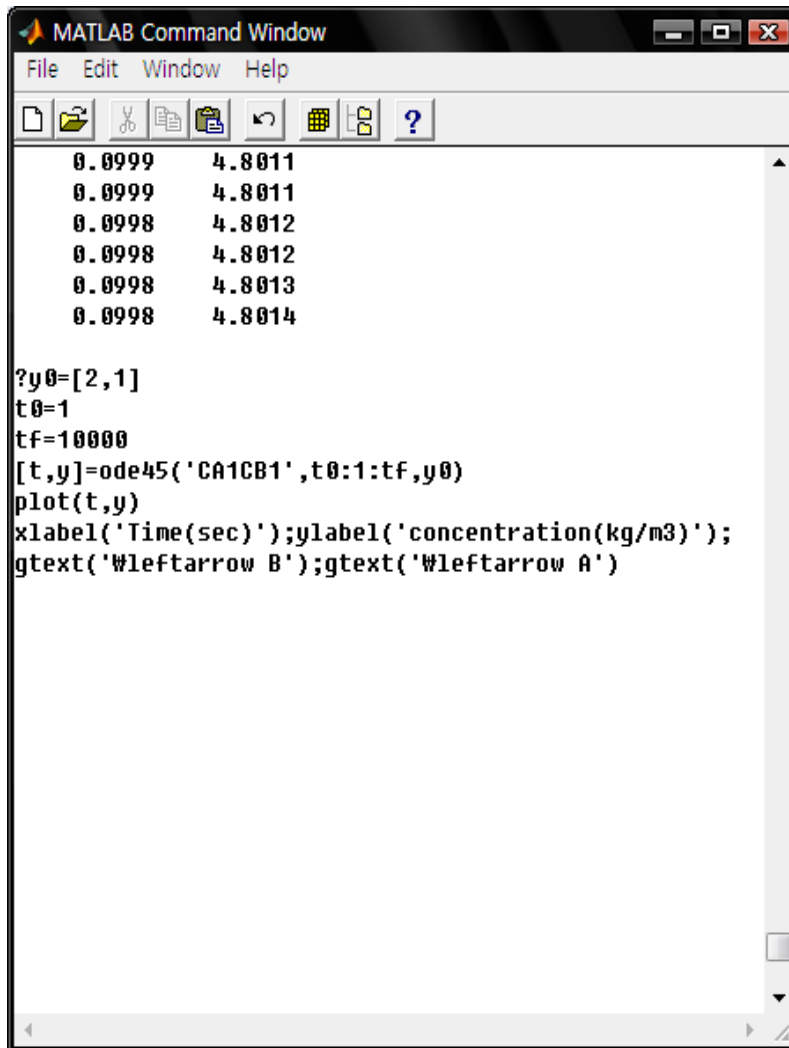
$$C_{A0} = 2\text{kg/m}^3, \quad C_{B0} = 1\text{kg/m}^3$$

• MATLAB programming



```
function dydt=dd(t,y)
global k
CA1=y(1)
CB1=y(1)
V=1
K=3*10^4
F=2.8*10^-8
CA0=2
CB0=1
dydt=[F/V+(CA0-CA1)-k*CA1;F/V+(CB0-CB1)+k*2*CA1]
|
```

Ready Line 13



The image shows a MATLAB Command Window window. The title bar reads "MATLAB Command Window". The menu bar includes "File", "Edit", "Window", and "Help". The toolbar contains icons for file operations (New, Open, Save, Print, Copy, Paste, Undo, Redo, Grid, Zoom, Help). The main area displays the following code and its output:

```
0.0999    4.8011
0.0999    4.8011
0.0998    4.8012
0.0998    4.8012
0.0998    4.8013
0.0998    4.8014

?y0=[2,1]
t0=1
tf=10000
[t,y]=ode45('CA1CB1',t0:1:tf,y0)
plot(t,y)
xlabel('Time(sec)');ylabel('concentration(kg/m3)');
gtext('\leftarrow B');gtext('\leftarrow A')
```

- Simulation result

