ERQ II – P1 Modelo 5

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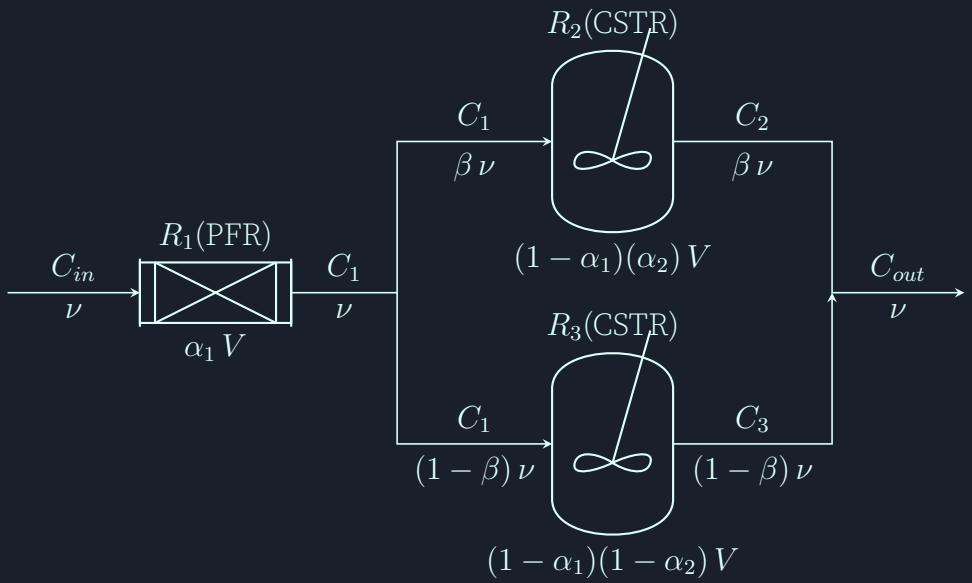
5 de maio de 2024

Conteúdo

1 Modelo


R_2(CSTR)
C_1
$\beta\,\nu$
C_2
$\beta\,\nu$
R_1(PFR)
C_{in}
ν
C_1
ν
$(1-\alpha_1)(\alpha_2)\,V$
C_{out}
ν
$\alpha_1\,V$
R_3(CSTR)
C_1
$(1-\beta)\,\nu$
C_3
$(1-\beta)\,\nu$
$(1-\alpha_1)(1-\alpha_2)\,V$

2.1 C2

$$\boldsymbol{C_{2,i+1} = C_{2,i} + \frac{C_{1,i} - C_{2,i}}{\tau} \frac{\beta}{(1-\alpha_1)(\alpha_2)} \Delta t}$$

$$C_1 \beta \nu = C_2 \beta \nu + (1-\alpha_1)(\alpha_2) V \frac{\mathrm{d}C_2}{\mathrm{d}t} \implies$$

$$\implies C_1 \beta = C_2 \beta + (1-\alpha_1)(\alpha_2) \tau \frac{\mathrm{d}C_2}{\mathrm{d}t} \implies$$

$$\implies \frac{\mathrm{d}C_2}{\mathrm{d}t} = \frac{C_1 - C_2}{\tau} \frac{\beta}{(1-\alpha_1)(\alpha_2)} \implies$$

$$\implies \frac{\Delta C_2}{\Delta t} = \frac{C_{2,i+1} - C_{2,i}}{\Delta t} = \frac{C_{1,i} - C_{2,i}}{\tau} \frac{\beta}{(1-\alpha_1)(\alpha_2)} \implies$$

$$\implies = C_{2,i+1} = C_{2,i} + \frac{C_{1,i} - C_{2,i}}{\tau} \frac{\beta}{(1-\alpha_1)(\alpha_2)} \Delta t$$

2.2 C3

$$\boldsymbol{C_{3,i+1} = C_{3,i} + \frac{C_1 - C_3}{\tau} \frac{1-\beta}{(1-\alpha_1)(1-\alpha_2)} \Delta t}$$

$$C_1 (1-\beta)\nu = C_3 (1-\beta)\nu + (1-\alpha_1)(1-\alpha_2) V \, \mathrm{d}C_3 t \implies$$

$$\implies \mathrm{d}C_3 t = \frac{C_1 - C_3}{\tau} \frac{1-\beta}{(1-\alpha_1)(1-\alpha_2)} \implies$$

$$\implies \Delta C_3 t = \frac{C_{3,i+1} - C_{3,i}}{\Delta t} = \frac{C_1 - C_3}{\tau} \frac{1-\beta}{(1-\alpha_1)(1-\alpha_2)} \implies$$

$$\implies C_{3,i+1} = C_{3,i} + \frac{C_1 - C_3}{\tau} \frac{1-\beta}{(1-\alpha_1)(1-\alpha_2)} \Delta t$$

2.3 C out

$$\boldsymbol{C_{out} = C_2\left(\beta\right) + C_3\left(1 - \beta\right)}$$

$$C_{out}\,\nu = C_2\left(\beta\right)\nu + C_3\left(1-\beta\right)\nu \implies$$
$$\implies C_{out} = C_2\left(\beta\right) + C_3\left(1-\beta\right)$$