ERQ II – P1 Modelo 5

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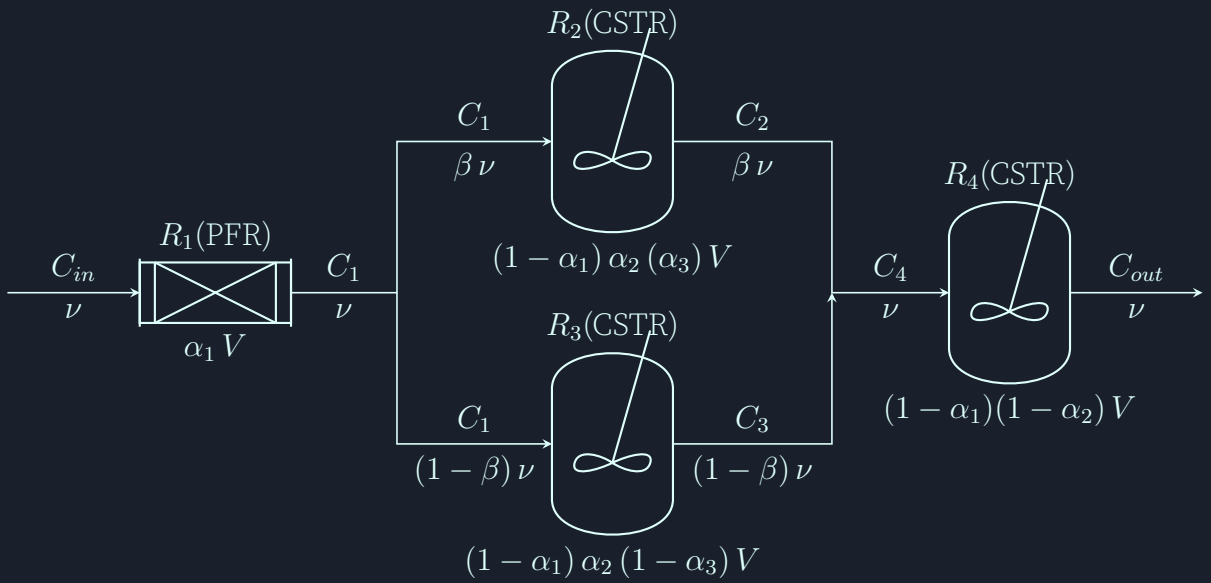
Conteúdo

1 Modelo


R_2(CSTR)
C_1
$\beta\,\nu$
C_2
$\beta\,\nu$
R_4(CSTR)
R_1(PFR)
C_{in}
ν
C_1
ν
$(1-\alpha_1)\,\alpha_2\,(\alpha_3)\,V$
C_4
ν
C_{out}
ν
$\alpha_1\,V$
R_3(CSTR)
C_1
$(1-\beta)\,\nu$
C_3
$(1-\beta)\,\nu$
$(1-\alpha_1)(1-\alpha_2)\,V$
$(1-\alpha_1)\,\alpha_2\,(1-\alpha_3)\,V$

2.1 C2

$$\boldsymbol{C_{2,i+1} = C_{2,i} + \frac{C_{1,i} - C_{2,i}}{\tau} \frac{\beta}{(1-\alpha_1)\,\alpha_2\,(\alpha_3)}\,\Delta t}$$

$$C_1\,\beta\,\nu = C_2\,\beta\,\nu + (1-\alpha_1)\,\alpha_2\,(\alpha_3)\,V\,\frac{\mathrm{d}C_2}{\mathrm{d}t} \implies$$

$$\implies C_1\,\beta = C_2\,\beta + (1-\alpha_1)\,\alpha_2\,(\alpha_3)\,\tau\,\frac{\mathrm{d}C_2}{\mathrm{d}t} \implies$$

$$\implies \frac{\mathrm{d}C_2}{\mathrm{d}t} = \frac{C_1 - C_2}{\tau}\frac{\beta}{(1-\alpha_1)\,\alpha_2\,(\alpha_3)} \implies$$

$$\implies \frac{\Delta C_2}{\Delta t} = \frac{C_{2,i+1} - C_{2,i}}{\Delta t} = \frac{C_{1,i} - C_{2,i}}{\tau}\frac{\beta}{(1-\alpha_1)\,\alpha_2\,(\alpha_3)} \implies$$

$$\implies C_{2,i+1} = C_{2,i} + \frac{C_{1,i} - C_{2,i}}{\tau}\frac{\beta}{(1-\alpha_1)\,\alpha_2\,(\alpha_3)}\,\Delta t$$

2.2 C3

$$\boldsymbol{C_{3,i+1} = C_{3,i} + \frac{C_1 - C_3}{\tau} \frac{1-\beta}{(1-\alpha_1)\,\alpha_2\,(1-\alpha_3)}\,\Delta t}$$

$$C_1\,(1-\beta)\,\nu = C_3\,(1-\beta)\,\nu + (1-\alpha_1)\,\alpha_2\,(1-\alpha_3)\,V\;\mathrm{d}C_3t \implies$$

$$\implies \mathrm{d}C_3t = \frac{C_1 - C_3}{\tau} \frac{1-\beta}{(1-\alpha_1)\,\alpha_2\,(1-\alpha_3)} \implies$$

$$\implies \Delta C_3t = \frac{C_{3,i+1} - C_{3,i}}{\Delta t} = \frac{C_{1,i} - C_{3,i}}{\tau} \frac{1-\beta}{(1-\alpha_1)\,\alpha_2\,(1-\alpha_3)} \implies$$

$$\implies C_{3,i+1} = C_{3,i} + \frac{C_{1,i} - C_{3,i}}{\tau} \frac{1-\beta}{(1-\alpha_1)\,\alpha_2\,(1-\alpha_3)}\,\Delta t$$

2.3 C4

$$\boldsymbol{C_4 = C_2\,(\beta) + C_3\,(1-\beta)}$$

$$C_4\,\nu = C_2\,(\beta)\,\nu + C_3\,(1-\beta)\,\nu \implies$$
$$\implies C_4 = C_2\,(\beta) + C_3\,(1-\beta)$$

2.4 C out

$$\boldsymbol{C_{out,i+1} = C_{out,i} + \frac{C_{4,i} - C_{out,i}}{(1-\alpha_1)(1-\alpha_2)\,\tau}\,\Delta t}$$

$$C_4\,\nu = C_{out}\,\nu + (1-\alpha_1)(1-\alpha_2)\,V\,\frac{\mathrm{d}C_{out}}{\mathrm{d}t} \implies$$

$$\implies C_4 = C_{out} + (1-\alpha_1)(1-\alpha_2)\,\tau\,\frac{\mathrm{d}C_{out}}{\mathrm{d}t} \implies$$

$$\implies \frac{\mathrm{d}C_{out}}{\mathrm{d}t} = \frac{C_4 - C_{out}}{(1-\alpha_1)(1-\alpha_2)\,\tau} \implies$$

$$\implies \frac{\Delta C_{out}}{\Delta t} = \frac{C_{out,i+1} - C_{out,i}}{\Delta t} = \frac{C_{4,i} - C_{out,i}}{(1-\alpha_1)(1-\alpha_2)\,\tau} \implies$$

$$\implies C_{out,i+1} = C_{out,i} + \frac{C_{4,i} - C_{out,i}}{(1-\alpha_1)(1-\alpha_2)\,\tau}\,\Delta t$$