6 Uždavinys

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1 Bedimensis modelis

$$\frac{\partial c_1}{\partial t} = -3c_1c_2 + D\Delta c_1 \tag{1a}$$
$$\frac{\partial c_2}{\partial t} = -5c_1c_2 + D\Delta c_2 \tag{1b}$$
$$\frac{\partial c_3}{\partial t} = 2c_1c_2 \tag{1c}$$

kur c_1, c_2, c_3 yra bedimensė medžiagų koncentracija, Δ - Laplaso operatorius, t - laikas, D - bedimensis medžiagų c_1 ir c_2 difuzijos koeficientas.

1.1 Elementų maišymasis stačiakampio gretasienio skerspjūvyje

Interpretavus bedimensį modelį (2) dviejose dimensijose gauname lygtis

$$\frac{\partial c_1}{\partial t} = -3c_1c_2 + D\left(\frac{\partial^2 c_1}{\partial x^2} + \frac{\partial^2 c_1}{\partial y^2}\right) \tag{2a}$$
$$\frac{\partial c_2}{\partial t} = -5c_1c_2 + D\left(\frac{\partial^2 c_2}{\partial x^2} + \frac{\partial^2 c_2}{\partial y^2}\right) \tag{2b}$$
$$\frac{\partial c_3}{\partial t} = 2c_1c_2 \tag{2c}$$

1.2 Pradinės sąlygos

$$\begin{aligned} c_1(x,y,0) &= \begin{cases} 1, \text{if } x \in A \\ 0, \text{otherwise} \end{cases} \quad, \quad (x,y) \in [0,L] \times [0,L] \\ c_2(x,y,0) &= \begin{cases} 1, \text{if } x \notin A \\ 0, \text{otherwise} \end{cases} \quad, \quad (x,y) \in [0,L] \times [0,L] \\ c_3(x,y,0) &= 0 \quad, \quad (x,y) \in [0,L] \times [0,L] \end{aligned} \tag{3}$$

where $A = [0, 0.5L] \times [0, 0.5L] \cup [0.5L, L] \times [0.5L, L]$.

1.3 Boundary conditions

$$\begin{aligned} \left.\frac{\partial u}{\partial x}\right|_{x=0} = \left.\frac{\partial u}{\partial x}\right|_{x=L} = 0, \quad y \in [0,L], \quad t \in [0,T] \\ \left.\frac{\partial u}{\partial y}\right|_{y=0} = \left.\frac{\partial u}{\partial y}\right|_{y=L} = 0, \quad x \in [0,L], \quad t \in [0,T] \end{aligned} \tag{4}$$