

№ 15.

$$\begin{cases} 0.63x_1 - 1.72x_2 + 3.37x_3 = -0.75; \\ -1.72x_1 - 2.27x_2 + 1.62x_3 = 1.27; \\ 3.27x_1 + 1.62x_2 - 0.43x_3 = 2.74. \end{cases}$$

$$\xi = 1e^{-3}$$

$$Ax=y, \quad A=U U^T, \quad U=\begin{pmatrix} u_{11} & u_{12} & u_{13} \\ 0 & u_{22} & u_{23} \\ 0 & 0 & u_{33} \end{pmatrix}, \quad A=\begin{pmatrix} u_{11}^2+u_{12}^2+u_{13}^2 & u_{12}u_{22}+u_{13}u_{23} & u_{13}u_{33} \\ u_{12}u_{22}+u_{13}u_{23} & u_{22}^2+u_{23}^2 & u_{23}u_{33} \\ u_{13}u_{33} & u_{23}u_{33} & u_{33}^2 \end{pmatrix}$$

все перемен

возвратя перемен

$$\begin{aligned} & \{a_{11} \rightarrow 0, -2.09487i, a_{12} \rightarrow -5.60623, a_{13} \rightarrow 0, -5.1392i, a_{22} \rightarrow -1.95787, a_{23} \rightarrow 0, -2.47048i, a_{33} \rightarrow 0, +0.655744i\}, \\ & \{a_{11} \rightarrow 0, +2.09487i, a_{12} \rightarrow -5.60623, a_{13} \rightarrow 0, -5.1392i, a_{22} \rightarrow -1.95787, a_{23} \rightarrow 0, -2.47048i, a_{33} \rightarrow 0, +0.655744i\}, \\ & \{a_{11} \rightarrow 0, -2.09487i, a_{12} \rightarrow 5.60623, a_{13} \rightarrow 0, -5.1392i, a_{22} \rightarrow 1.95787, a_{23} \rightarrow 0, -2.47048i, a_{33} \rightarrow 0, +0.655744i\}, \\ & \{a_{11} \rightarrow 0, +2.09487i, a_{12} \rightarrow 5.60623, a_{13} \rightarrow 0, -5.1392i, a_{22} \rightarrow 1.95787, a_{23} \rightarrow 0, -2.47048i, a_{33} \rightarrow 0, +0.655744i\}, \\ & \{a_{11} \rightarrow 0, -2.09487i, a_{12} \rightarrow -5.60623, a_{13} \rightarrow 0, +5.1392i, a_{22} \rightarrow -1.95787, a_{23} \rightarrow 0, +2.47048i, a_{33} \rightarrow 0, -0.655744i\}, \\ & \{a_{11} \rightarrow 0, +2.09487i, a_{12} \rightarrow -5.60623, a_{13} \rightarrow 0, +5.1392i, a_{22} \rightarrow -1.95787, a_{23} \rightarrow 0, +2.47048i, a_{33} \rightarrow 0, -0.655744i\}, \\ & \{a_{11} \rightarrow 0, -2.09487i, a_{12} \rightarrow 5.60623, a_{13} \rightarrow 0, +5.1392i, a_{22} \rightarrow 1.95787, a_{23} \rightarrow 0, +2.47048i, a_{33} \rightarrow 0, -0.655744i\}, \\ & \{a_{11} \rightarrow 0, +2.09487i, a_{12} \rightarrow 5.60623, a_{13} \rightarrow 0, +5.1392i, a_{22} \rightarrow 1.95787, a_{23} \rightarrow 0, +2.47048i, a_{33} \rightarrow 0, -0.655744i\} \end{aligned}$$

$$u=\begin{pmatrix} -2.09i & -5.6 & -5.14i \\ 0 & -1.96 & -2.47i \\ 0 & 0 & 0.66i \end{pmatrix}$$

$$\begin{aligned} & U U^T x = y \\ & U z = y \end{aligned}$$

$$\begin{pmatrix} -2.09i & -5.6 & -5.14i \\ 0 & -1.96 & -2.47i \\ 0 & 0 & -0.66i \end{pmatrix} \begin{pmatrix} z_1 \\ z_2 \\ z_3 \end{pmatrix} = \begin{pmatrix} -209i z_1 - 560 z_2 - 514i z_3 \\ 100 \\ -196 z_2 - 247i z_3 \\ 100 \\ -33i z_3 \\ 50 \end{pmatrix} = \begin{pmatrix} -0.75 \\ 1.27 \\ 2.74 \end{pmatrix}$$

$$\frac{33}{50} i z_3 = -2.74 \quad \left| \cdot \frac{50}{33i} \right| \quad -1.96 z_2 - 2.47 \cdot 4.15i = 1.27$$

$$z_2 = (1.27 + 2.47 \cdot 4.15i) \cdot \frac{1}{-1.96} \cdot (-1)$$

$$z_3 = 2.74 \cdot \frac{50}{33} i = 4.15i$$

$$z_2 = -0.65 - 5.23i$$

$$z_1 \cdot (-2.09i) = 5.14i \cdot 4.15i + 5.6 \cdot (-0.65 - 5.23i) \quad \left| \cdot \frac{i}{2.09} \right|$$

$$z_1 = \frac{-i \cdot 5.14 \cdot 4.15 - i \cdot 5.6 \cdot 0.65 + 5.6 \cdot 5.23}{2.09} = \frac{-i(21.33 + 3.64) + 29.29}{2.09} = 14.01 - 11.95i$$

$$U^T x = z$$

$$\begin{pmatrix} \frac{-209 \cdot i}{100} & 0 & 0 \\ \frac{-28}{5} & \frac{-49}{25} & 0 \\ \frac{-257 \cdot i}{50} & \frac{-247 \cdot i}{100} & \frac{-33 \cdot i}{50} \end{pmatrix} \cdot \begin{pmatrix} x_1 \\ x_2 \\ x_3 \end{pmatrix} = \begin{pmatrix} \frac{-209i \cdot x_1}{100} \\ \frac{-140x_1 - 49x_2}{25} \\ \frac{-514i \cdot x_1 - 247i \cdot x_2 - 66i \cdot x_3}{100} \end{pmatrix}$$

$$= \begin{pmatrix} 4,16i \\ -0,65 - 5,23i \\ 14,01 - 11,95i \end{pmatrix}$$

$$x_1 =$$

2-ое задание (метод итераций)

$$\frac{q^k}{1-q} \cdot \|x^1 - x^0\|_1 < \xi = 1e^{-3}$$

$$\left| \frac{(1-q)}{\|x^1 - x^0\|_1} \right|$$

$$q^k < \frac{\xi(1-q)}{\|x^1 - x^0\|_1} \quad \left| \log q \dots \right.$$

$$k > \log_q \frac{\xi(1-q)}{\|x^1 - x^0\|_1}$$

$$k = \left\lceil \log_q \frac{\xi(1-q)}{\|x^1 - x^0\|_1} \right\rceil$$

