№3 №1572

$$A = \begin{pmatrix} \frac{1}{2} & \frac{1}{2} & -\frac{\sqrt{2}}{2} \\ \frac{1}{2} & \frac{1}{2} & \frac{\sqrt{2}}{2} \\ \frac{1}{2}\sqrt{2} & -\frac{\sqrt{2}}{2} & 0 \end{pmatrix}$$

$$\det|A-\lambda E| = \begin{vmatrix} \frac{1}{2}-\lambda & \frac{1}{2} & -\frac{\sqrt{2}}{2} \\ \frac{1}{2} & \frac{1}{2}-\lambda & \frac{\sqrt{2}}{2} \\ \frac{\sqrt{2}}{2} & -\frac{\sqrt{2}}{2} & -\lambda \end{vmatrix} = \begin{vmatrix} 1-\lambda & 1-\lambda & 0 \\ \frac{1}{2} & \frac{1}{2}-\lambda & \frac{\sqrt{2}}{2} \\ \frac{\sqrt{2}}{2} & -\frac{\sqrt{2}}{2} & -\lambda \end{vmatrix} =$$

$$= \begin{vmatrix} 1-\lambda & 0 & 0 \\ \frac{1}{2} & -\lambda & \frac{\sqrt{2}}{2} \\ \frac{\sqrt{2}}{2} & -\sqrt{2} & -\lambda \end{vmatrix} = (1-\lambda)\begin{vmatrix} -\lambda & \frac{\sqrt{2}}{2} \\ -\sqrt{2} & -\lambda \end{vmatrix} =$$

$$= -(1-\lambda)(\lambda^2+2)$$

$\lambda_1 = 1$

$\lambda_2 = -i$

$\lambda_3 = i$

$$|A-E| = \begin{pmatrix} -\frac{1}{2} & \frac{1}{2} & -\frac{\sqrt{2}}{2} \\ \frac{1}{2} & -\frac{1}{2} & \frac{\sqrt{2}}{2} \\ \frac{\sqrt{2}}{2} & -\frac{\sqrt{2}}{2} & -1 \end{pmatrix} \times (-2) = \begin{pmatrix} 1 & -1 & \sqrt{2} \\ 0 & 0 & -2 \\ 0 & 0 & 0 \end{pmatrix} =$$

$$= \begin{pmatrix} 1 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$$

x_1	x_2	x_3
1	1	0

$$e_1 = \frac{\vec{n}}{|\vec{n}|} = \frac{(1,1,0)}{\sqrt{2}} = \frac{1}{\sqrt{2}}(1,1,0)$$

$$|A+iE| = \begin{pmatrix} \frac{1}{2}+i & \frac{1}{2} & -\frac{\sqrt{2}}{2} \\ \frac{1}{2} & \frac{1}{2}+i & \frac{\sqrt{2}}{2} \\ \frac{\sqrt{2}}{2} & -\frac{\sqrt{2}}{2} & i \end{pmatrix} = \begin{pmatrix} \frac{1+2i}{2} & \frac{1}{2} & -\frac{\sqrt{2}}{2} \\ 0 & \frac{2+6i}{5} & \frac{(3-i)\sqrt{2}}{5} \end{pmatrix}$$

$$= \begin{pmatrix} 1+2i & 1 & -\sqrt{2} \\ 0 & 2+6i & (3-i)\sqrt{2} \end{pmatrix}$$

x_1	x_2	x_3
$-\frac{i\sqrt{2}}{2}$	$-\frac{\sqrt{2}}{2}$	1

$$h = \left(-\frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2}, 0\right)$$

$$m = (0,0,1)$$

$$B = \Phi^{-1} A \Phi = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 0 & 1 \\ 0 & -1 & 0 \end{pmatrix}$$

1575

$$A = \begin{pmatrix} \frac{3}{4} & \frac{1}{4} & -\frac{\sqrt{6}}{4} \\ \frac{1}{4} & \frac{3}{4} & \frac{\sqrt{6}}{4} \\ \frac{\sqrt{6}}{4} & -\frac{\sqrt{6}}{4} & \frac{1}{2} \end{pmatrix}$$

$$|A-\lambda E| = \begin{vmatrix} \frac{3}{4}-\lambda & \frac{1}{4} & -\frac{\sqrt{6}}{4} \\ \frac{1}{4} & \frac{3}{4}-\lambda & \frac{\sqrt{6}}{4} \\ \frac{\sqrt{6}}{4} & -\frac{\sqrt{6}}{4} & \frac{1}{2}-\lambda \end{vmatrix} = -\lambda^3 + 2\lambda^2 - 2\lambda + 1 =$$

$$= -(\lambda-1)\cdot(\lambda^2-\lambda+1) =$$

$$= (\lambda-1)\left(\lambda - \frac{1+\sqrt{3}\cdot i}{2}\right)\cdot\left(\lambda - \frac{1-\sqrt{3}\cdot i}{2}\right) = 0$$

$\lambda_1 = 1$

$\lambda_2 = \frac{i\sqrt{3}+1}{2}$

$\lambda_3 = \frac{(i\sqrt{3})+1}{2}$

$$|A-E| = \begin{vmatrix} -\frac{1}{4} & \frac{1}{4} & -\frac{\sqrt{6}}{4} \\ \frac{1}{4} & -\frac{1}{4} & -\frac{\sqrt{6}}{4} \\ \frac{\sqrt{6}}{4} & -\frac{\sqrt{6}}{4} & -\frac{1}{2} \end{vmatrix} = \begin{vmatrix} 1 & -1 & \sqrt{6} \\ 0 & 0 & -2 \end{vmatrix} = \begin{vmatrix} 1 & -1 & 0 \\ 0 & 0 & 4 \end{vmatrix}$$

X_1	X_2	X_3
1	1	0

$$C_1 = -\frac{1}{1}(1,1,0)$$

$$(A-\lambda_2 E) = \begin{vmatrix} \frac{3}{4} & \frac{-i\sqrt{3}+1}{2} & -\frac{\sqrt{6}}{4} \\ \frac{1}{4} & \frac{3}{4} - \frac{i\sqrt{3}+1}{2} & \frac{\sqrt{6}}{4} \\ \frac{\sqrt{6}}{4} & -\frac{\sqrt{6}}{4} & \frac{1}{2} - \frac{i\sqrt{3}+1}{2} \end{vmatrix} =$$

$$= \begin{pmatrix} \frac{2-i\sqrt{3}}{4} & \frac{1}{4} & -\frac{\sqrt{6}}{4} \\ 0 & \frac{i\sqrt{3}+3}{12} & -\frac{3i\sqrt{2}-\sqrt{6}}{6} \end{pmatrix}$$

X_1	X_2	X_3
$-\frac{i\sqrt{2}}{2}$	$\frac{i\sqrt{2}}{2}$	1

$$l = \left(\frac{-i\sqrt{2}}{2}, \frac{i\sqrt{2}}{2}, 0\right) + (0,0,1) \cdot \text{min}$$

$$n = \left(-\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2}, 0\right) \quad m = (0,0,1)$$

$m \perp n \qquad |m|=1 \quad |n|=1$

$z: \quad l = m + in = x + iy$

$y = n = (0, 0, 1)$, $g = \left(-\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2}, 0\right)$

$\alpha = \frac{1}{2}$ $\beta = -\frac{\sqrt{3}}{2}$ gem h

$$O_z \begin{pmatrix} \frac{\sqrt{2}}{2} & \frac{\sqrt{2}}{2} & 0 \\ \frac{\sqrt{2}}{2} & -\frac{\sqrt{2}}{2} & 0 \\ 0 & 0 & -1 \end{pmatrix} \begin{pmatrix} \frac{1}{2} & -\frac{\sqrt{3}}{2} \\ \frac{\sqrt{3}}{2} & \frac{1}{2} \end{pmatrix}$$

$$B = \begin{pmatrix} 1 & 0 & 0 \\ 0 & \frac{1}{2} & \frac{\sqrt{3}}{2} \\ 0 & -\frac{\sqrt{3}}{2} & \frac{1}{2} \end{pmatrix}$$