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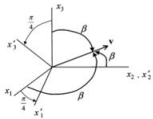


FIGURE E2.5-1
Vector \mathbf{v} with respect to axes $Ox_1'x_2'$ and Ox_1x_2 .

Example 2.5-1
Let the primed axes $Ox_1'x_2'$ be given with respect to the unprimed axes by a 45° counterclockwise rotation about the x_2 axis as shown. Determine the primed components of the vector given by $\mathbf{v} = 4\mathbf{e}_1 + 4\mathbf{e}_2$.

Solution
Here the transformation matrix is

$$[a_{ij}] = \begin{bmatrix} 1/\sqrt{2} & 0 & -1/\sqrt{2} \\ 0 & 1 & 0 \\ 1/\sqrt{2} & 0 & 1/\sqrt{2} \end{bmatrix}$$

and from Eq 2.5-9 in matrix form

$$\begin{bmatrix} v_1' \\ v_2' \\ v_3' \end{bmatrix} = \begin{bmatrix} 1/\sqrt{2} & 0 & -1/\sqrt{2} \\ 0 & 1 & 0 \\ 1/\sqrt{2} & 0 & 1/\sqrt{2} \end{bmatrix} \begin{bmatrix} 4 \\ 4 \\ 0 \end{bmatrix} = \begin{bmatrix} 0 \\ 4 \\ \sqrt{2} \end{bmatrix}$$

Example 2.5-2
Determine the primed components of the tensor

$$[T_{ij}] = \begin{bmatrix} 2 & 6 & 4 \\ 0 & 8 & 0 \\ 4 & 2 & 0 \end{bmatrix}$$

under the rotation of axes described in Example 2.5-1.

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