

Special Problem 2.4-13

Consider vector \mathbf{A} , written in terms of orthonormal base vectors $\hat{a}_x, \hat{a}_y, \hat{a}_z$ as:

$$\mathbf{A} = 2 \hat{a}_x + 4 \hat{a}_z$$

We wish to express vector \mathbf{A} in terms of a **new** set of orthonormal base vectors $\hat{i}, \hat{j}, \hat{k}$, i.e.:

$$\mathbf{A} = A_i \hat{i} + A_j \hat{j} + A_k \hat{k}$$

We know the following facts:

1. The **scalar projection** of vector \mathbf{A} onto the direction \hat{k} is equal to $-3\sqrt{2}$.
2. The **scalar component** of vector \hat{i} in the direction \hat{a}_x is equal to 0.5.
3. The **vector component** of \hat{i} in the direction \hat{a}_z is equal to $-0.5 \hat{a}_z$.
4. The **angle** formed between vectors \hat{j} and \hat{a}_x is equal to 60° .
5. The **dot product** of vectors \hat{j} and \hat{a}_z is equal to -0.5.

Determine values $A_i, A_j,$ and A_k .