

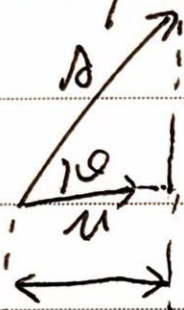
$$= |\vec{A}|^2 - |\vec{A} \times \vec{B}|^2$$

$$\vec{A} \cdot \vec{B} = |\vec{A}| |\vec{B}| \cos \theta$$

session 4: Vector Components

chalkboard:

Components of \vec{A} along direction \hat{u} , $|\hat{u}| = 1$



$$\text{components of } \vec{A} \text{ along } \hat{u} = |\vec{A}| \cdot \cos \theta \cdot |\hat{u}|$$

$$= \vec{A} \cdot \hat{u}$$

★ components is a scalar (向量分量)

Readings and example

$|\vec{A}| \cos \theta$: the components of \vec{A} along \hat{u}

also called orthogonal projection
(正交投影)



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For non-unit ~~\vec{A}~~

the component of \vec{A} in the direction of \vec{B} :

$$\hat{u} = \frac{\vec{B}}{|\vec{B}|}, \text{ component of } \vec{A} = \vec{A} \cdot \hat{u}$$

Ex: the component of \vec{A} along \vec{B}

1. $\vec{A} = \vec{i} + 2\vec{j}$, $\vec{B} = 3\vec{i} + 4\vec{j}$.

$$\text{Component} = \frac{\vec{A} \cdot \vec{B}}{|\vec{B}|} = \frac{3+8}{\sqrt{9+16}} = \frac{11}{5}$$

2. $\vec{A} = \langle 2, 2 \rangle$

$$\hat{u} = \langle -1, 0 \rangle$$

$$\text{component } \vec{A} = \vec{A} \cdot \hat{u} = -2$$

Problems:

1. a) Let $\vec{A} = \langle 1, 3 \rangle$, $\vec{B} = \langle 3, 4 \rangle$

i) the component of \vec{A} along \vec{B}

$$\vec{A} \cdot \vec{B}$$