Coordinate Direction Angles

Angles between vector and positive x,y,z.
α, β, $\gamma \, \epsilon \, [0 \, \text{deg}, 180 \, \text{deg}]$
$\cos\alpha = \frac{A_x}{A} \;\; \cos\beta = \frac{A_y}{A} \;\; \cos\gamma = \frac{A_z}{A}$
$\vec{A} = A\cos\alpha\,\hat{i} + A\cos\beta\,\hat{j} + A\cos\gamma\,\hat{k}$
$\hat{u}_A = \frac{\vec{A}}{A} = \cos\alpha\,\hat{i} + \cos\beta\,\hat{j} + \cos\gamma\,\hat{k}$
$\cos^2\alpha + \cos^2\beta + \cos^2\gamma = 1$

Dot Product

$\vec{A} \cdot \vec{B} = AB\cos\theta$
$\vec{A} \cdot \vec{B} = A_xB_x + A_yB_y + A_zB_z$

Projection of a Vector

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$\text{proj}_{\vec{A}}(\vec{B}) = \frac{\vec{B}\cdot\vec{A}}{\vec{A}\cdot\vec{A}}\vec{A}$

Transverse & Azimuthal Angles

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Cross Product

$$\vec{A} \times \vec{B} = \begin{vmatrix} i & j & k \\ A_x & A_y & A_z \\ B_x & B_y & B_z \end{vmatrix}$$

Triple Scalar Product

$\vec{C} \cdot (\vec{A} \times \vec{B})$