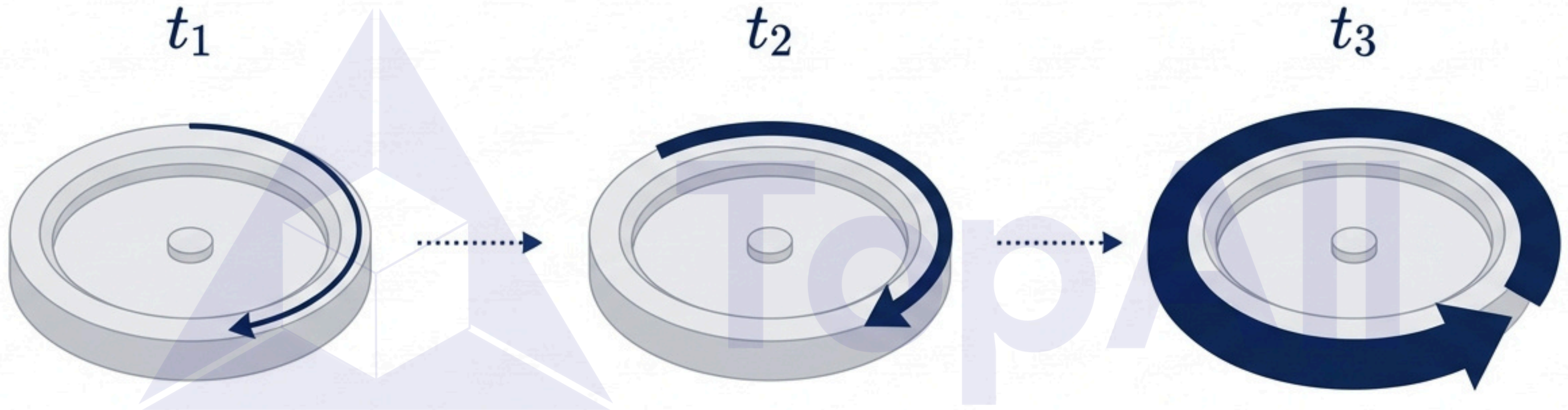


When Rotation Speeds Up



Just as an object moving in a straight line can speed up or slow down, a spinning object experiences changes in its rotational speed. How do we measure this change?

Defining Angular Acceleration via Analogy

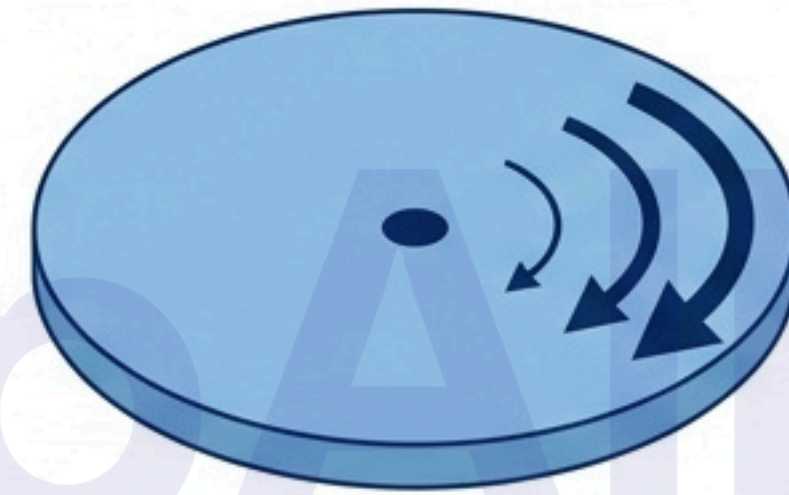
Linear Acceleration (a)



The time rate of change of linear velocity.

$$a = \frac{dv}{dt}$$

Angular Acceleration (α)



The time rate of change of angular velocity.

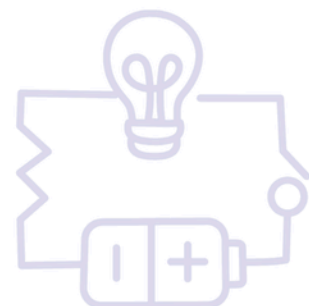
$$\alpha = \frac{d\omega}{dt}$$

We develop the study of rotational motion parallel to the study of translational motion.
The logic remains identical; only the geometry changes.



**You've Learned the Theory.
Let's Test Them Now.**

$$E=mc^2$$



Turn theory into marks with **unlimited MCQs, smart analysis, and focused revision.**

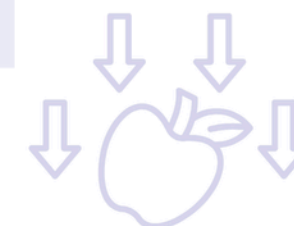
Practice Now



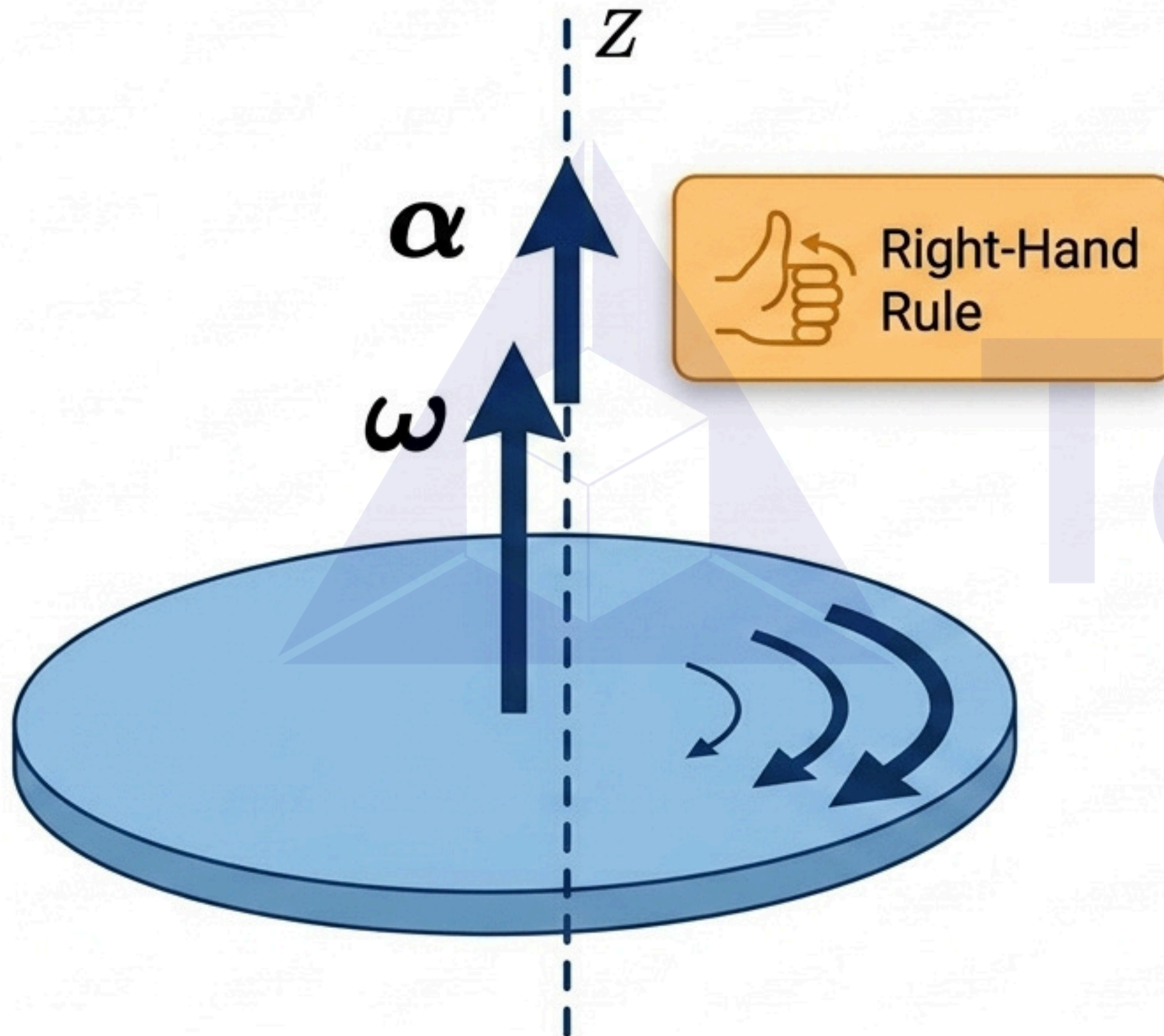
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The Formal 3D Vector Reality

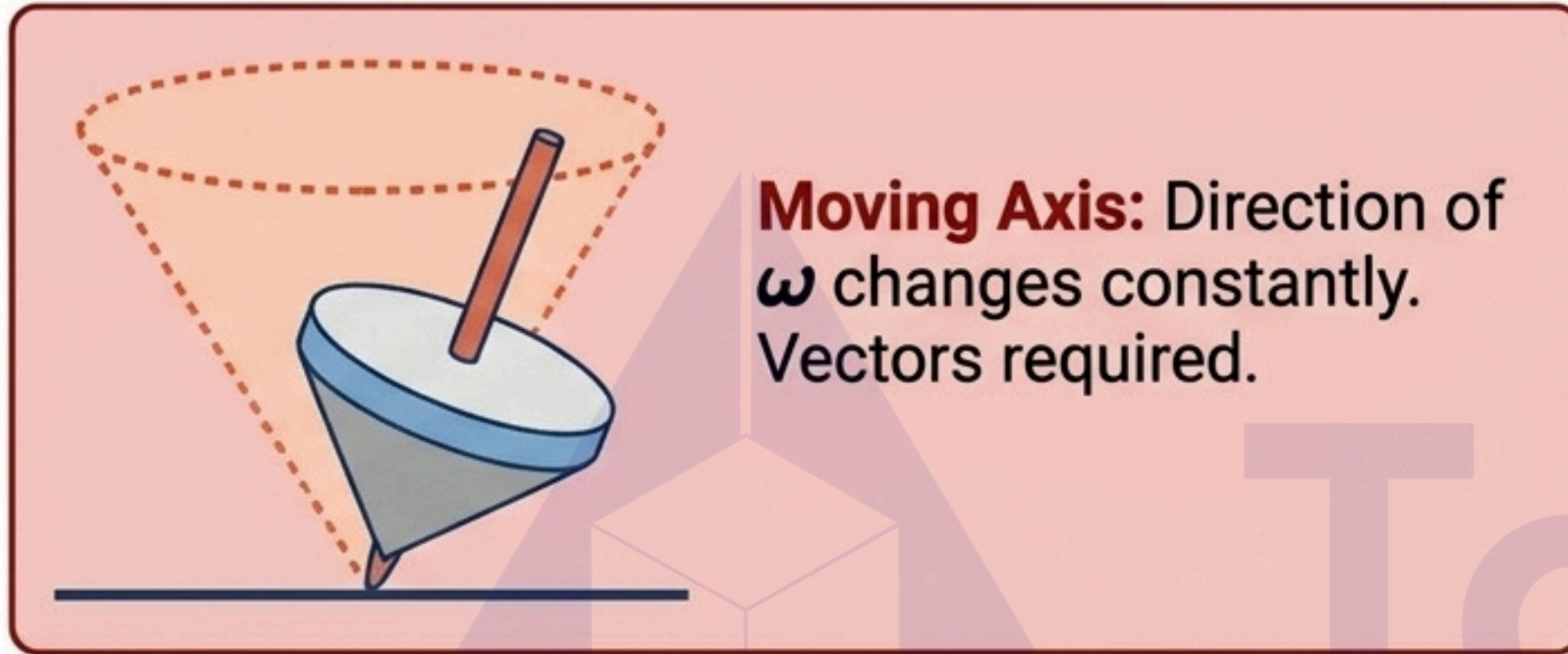


Eq. 6.21

$$\alpha = \frac{d\omega}{dt}$$

- Angular velocity (ω) is not just a speed; it is a 3D vector.
- Therefore, Angular Acceleration (α) is also a vector representing the time rate of change of ω .
- If the spinning speeds up, α points in the same direction as ω .

The Fixed-Axis Simplification



$$\boldsymbol{\alpha} = \frac{d\boldsymbol{\omega}}{dt}$$

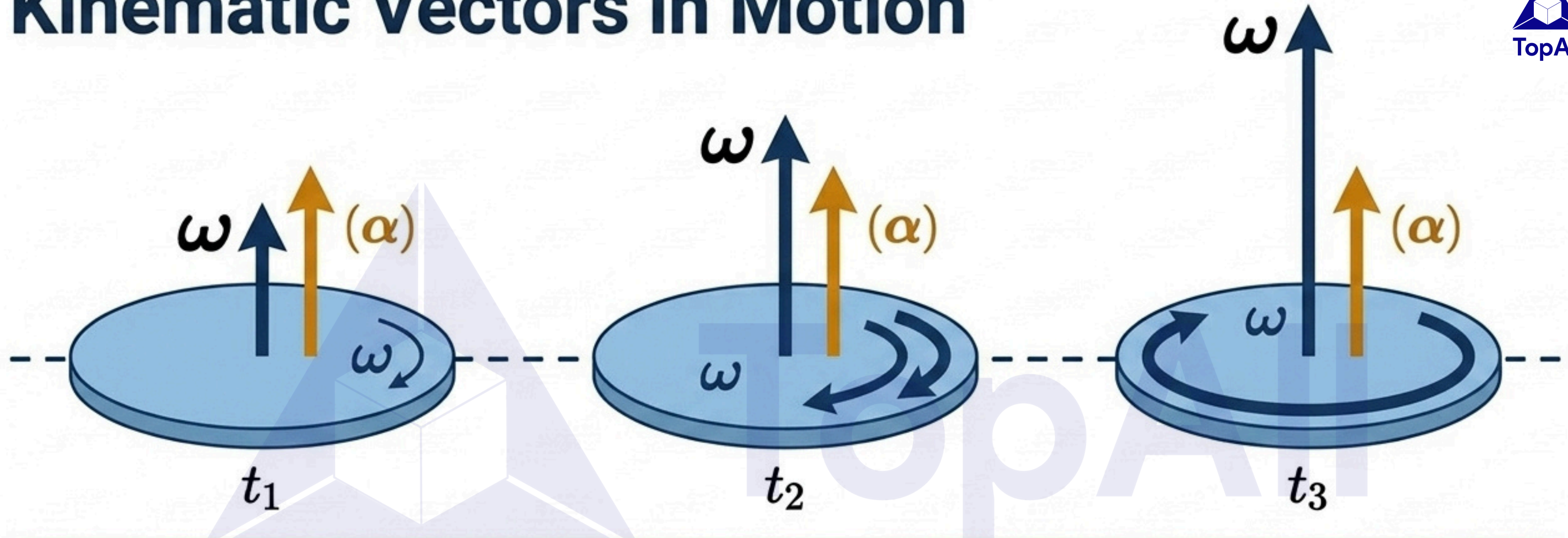


Eq. 6.22:

$$\alpha = \frac{d\omega}{dt}$$

When the axis is fixed, we drop the bold vector notation. The math elegantly collapses from 3D vector calculus into a simple 1D scalar equation.

Kinematic Vectors in Motion



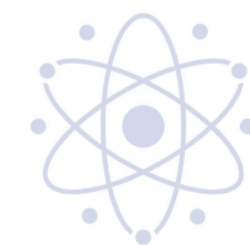
Angular Acceleration (α) is the rate at which angular velocity (ω) **grows or shrinks over time**. For a **fixed axis**, we measure it simply as $\alpha = \frac{d\omega}{dt}$.

Just as linear force drives linear acceleration (α), it requires a rotational force—Torque—to generate this angular acceleration (α).



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