20-R-KM-DK-4

July 31, 2020 11:23 AM

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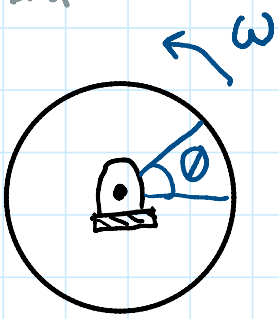
Inspiration : None

Beginner

Rotation About a Fixed Axis



The flywheel rotates with an angular velocity of ***omega = 0.002theta^3*** **rad/s**.
Determine the angular acceleration when it has rotated ***5 revolutions***.

$\omega = 0.002\theta^3$ $\quad \frac{d\omega}{dt} = \frac{d\theta}{dt}(0.006\theta^2)$ $\quad \alpha = \omega(0.006\theta^2)$

α ↓ $\quad \omega$ ↓

$\alpha = (0.002\theta^3)(0.006\theta^2) = 0.000012\theta^5$

5 revolutions $\Rightarrow 5 \times 2\pi = 10\pi$ rad

$\alpha = 0.000012(10\pi)^5 =$ **367.2236 rad/s²**