Answer on Question #66768, Physics / Mechanics | Relativity

An automobile traveling at 80km/hr has tyre of radius 80cm .on applying brakes the car is brought to a stop in30 complete turns of tyres.what is the magnitude of the angular acceleration of the wheels.

Solution:

The initial speed of the car

v = (80 km/h) x (1000 m/km) x (1 h/3600 s) = 22.2 m/s.

The tire radius is

R = 0.800/2 = 0.4 m.

So

ω_0 = v/R = 22.2 m/s / 0.4 m = 55.5 rad/s.

With

θ= (30.0)x(2Π) = 188 rad ω = 0

$\omega^2 = \omega_0^2 + 2\alpha\theta$

$\alpha = \omega_0^2 / 2\,\theta = (55.5\ rad/s)^2 / 2 \times 188\ rad = 8.19\ rad/s^2$

Answer: 8.19 rad/s^2