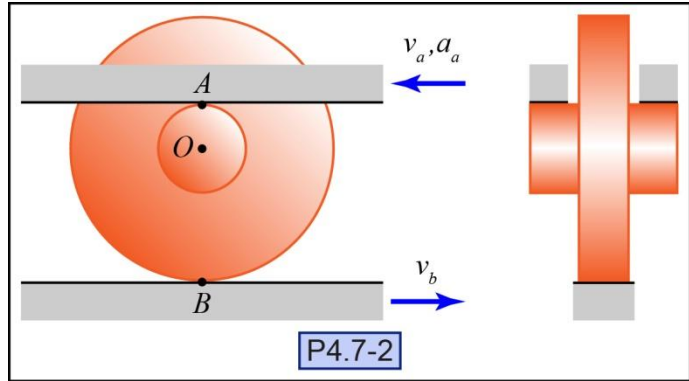


P4.7-2) A wheel is trapped and rolls without slip between two moving surfaces. The wheel has an inner hub and an outer hub. The radius of the inner hub is 6 inches and the radius of the outer hub is 18 inches. The velocity and acceleration of the surface touching the inner hub is 0.5 ft/s and 0.2 ft/s² respectively, in the direction shown, and the velocity of the surface touching the outer hub is a constant 2 ft/s, in the direction shown. Find the angular velocity and acceleration of the wheel and the velocity and acceleration of the wheel's center at this instant.



Given:

Find:

Solution:

Calculate the angular velocity of the wheel.

$$\omega = \underline{\hspace{2cm}}$$

Calculate the velocity of the wheel center.

$$\mathbf{v}_O = \underline{\hspace{2cm}}$$

Calculate the angular acceleration of the wheel.

What is the tangential acceleration of point A and B?

$$a_{At} = \underline{\hspace{2cm}}$$

$$a_{Bt} = \underline{\hspace{2cm}}$$

Relate the acceleration of point A and B.

$$\mathbf{a}_B = \underline{\hspace{2cm}}$$

Use what you know about the acceleration of A and B to calculate the angular acceleration of the wheel.

$$\alpha = \underline{\hspace{2cm}}$$

Calculate the acceleration of the wheel center.

What direction is the acceleration of the wheel center? Draw this on the figure.

$$\mathbf{a}_O = \underline{\hspace{2cm}}$$