1. Define the symbols in the acceleration formula:

\[ \mathbf{a}_B = \mathbf{a}_{B/Axyz} + \mathbf{a}_{B'} + 2 \Omega \times \mathbf{v}_{B/Axyz} \]

2. The Geneva mechanism shown consists of a star wheel \( S \) and a driving wheel \( D \), as shown. It is known that the driving wheel \( D \) rotates with a constant angular velocity \( \omega_D = 3 \text{ rad/s} \). For the instant when \( \theta = 60^\circ \), determine the angular velocity \( \omega_S \) and the velocity \( \mathbf{v}_{B/S} \) of the engaging pin \( B \) relative to the wheel \( S \).

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1. \( OXYZ \): fixed reference frame. \( Axyz \): rotating reference frame.

\( \mathbf{a}_B = \) acceleration of \( B \) measured in \( OXYZ \)

\( \mathbf{a}_{B/Axyz} = \) acceleration of \( B \) measured in \( Axyz \)

\( \mathbf{a}_{B'} = \) acceleration of \( B' \) measured in \( OXYZ \), where \( B' \) is a point embedded in \( Axyz \) but coincides with point \( B \) at the instant under consideration

\( \Omega = \) angular velocity of \( Axyz \) measured in \( OXYZ \)

\( \mathbf{v}_{B/Axyz} = \) velocity of \( B \) measured in \( Axyz \)

2. Let \( AXYZ \) be the fixed reference frame and \( Axyz \) be embedded in the star wheel with the \( x \) axis directed along the line \( AB \).

\[ \omega_S = 1.225 \text{ rad/s} \]

\[ \mathbf{v}_{B/S} = 16.17 \text{ in./s} \]

\[ \theta = 132.4^\circ \]