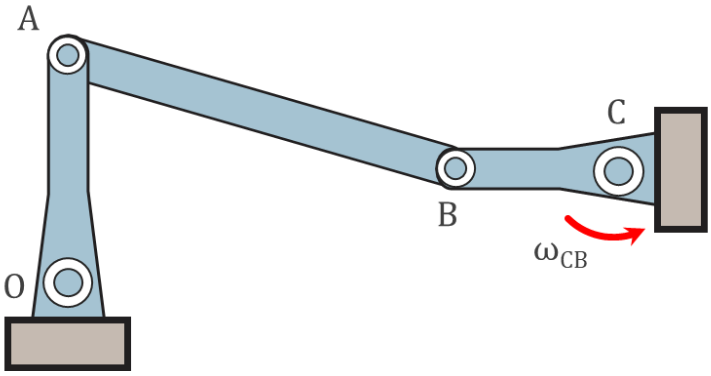
Acceleration of Linkage



Crank CB **has a constant angular velocity in the position shown during a short interval of its motion. To determine the angular acceleration of links** AB **and** OA **for this position two relations for the acceleration in point** A **can be written and set equal to each other. Select the** *two* **expressions for** a_A **that must set equal to each other to solve for** α_{AB} **and** α_{OA}**.**

Using known expressions:

$$\boldsymbol{a_A} = \boldsymbol{a_O} + \boldsymbol{a_{A/O,n}} + +\boldsymbol{a_{A/O,t}} \tag{1}$$

$$\boldsymbol{a_{A/O,n}} = \boldsymbol{\omega_{OA}} \times (\boldsymbol{\omega_{OA}} \times \boldsymbol{r_{A/O}}) \tag{2}$$

$$\boldsymbol{a_{A/O,t}} = \boldsymbol{\alpha_{OA}} \times \boldsymbol{r_{A/O}} \tag{3}$$

Inserting Equations 2 and 3 in Equation 1, together with the fact that point O is fixed to the base, hence $\boldsymbol{a_O} = 0$ gives:

$$\boldsymbol{a_A} = \boldsymbol{\omega_{OA}} \times (\boldsymbol{\omega_{OA}} \times \boldsymbol{r_{A/O}}) + \boldsymbol{\alpha_{OA}} \times \boldsymbol{r_{A/O}} \tag{4}$$

We do the same for the second relation, only we start from the other side, so side B. Here $\boldsymbol{a_B} \neq 0$, this results in:

$$\boldsymbol{a_A} = \boldsymbol{a_B} + \boldsymbol{\omega_{BA}} \times (\boldsymbol{\omega_{BA}} \times \boldsymbol{r_{A/B}}) + \boldsymbol{\alpha_{BA}} \times \boldsymbol{r_{A/B}} \tag{5}$$

These two equations can be set equal to each other to solve for $\boldsymbol{\alpha_{OA}}$ and $\boldsymbol{\alpha_{BA}}$.