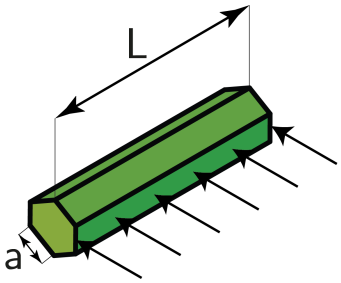
Reynolds Number 05

Give an expression for the Reynolds number in terms of given variables.



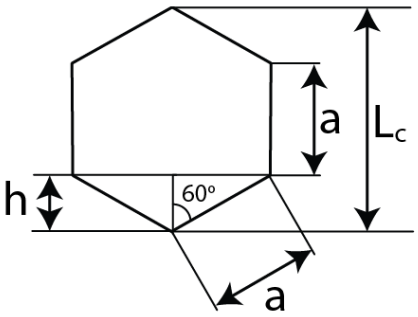
The standard expression for the Reynolds number is:

$$\mathrm{Re} = \frac{\rho U L_\mathrm{c}}{\eta}$$

Note that $\nu = \frac{\eta}{\rho}$.

Furthermore, the characteristic length has to be determined. For transverse flow along a cylinder, this is the height of the cylinder from top to bottom.

Which in the given situation can be determined by the use of trigonometry:



$$\cos(60^\mathrm{o}) = \frac{h}{a}$$

$$h = a\cos(60^\mathrm{o}) = \frac{a}{2}$$

$$L_\mathrm{c} = a + 2h = 2a$$

And therefore the Reynolds number can be expressed as:

$$\mathrm{Re} = \frac{2Ua}{\nu}$$