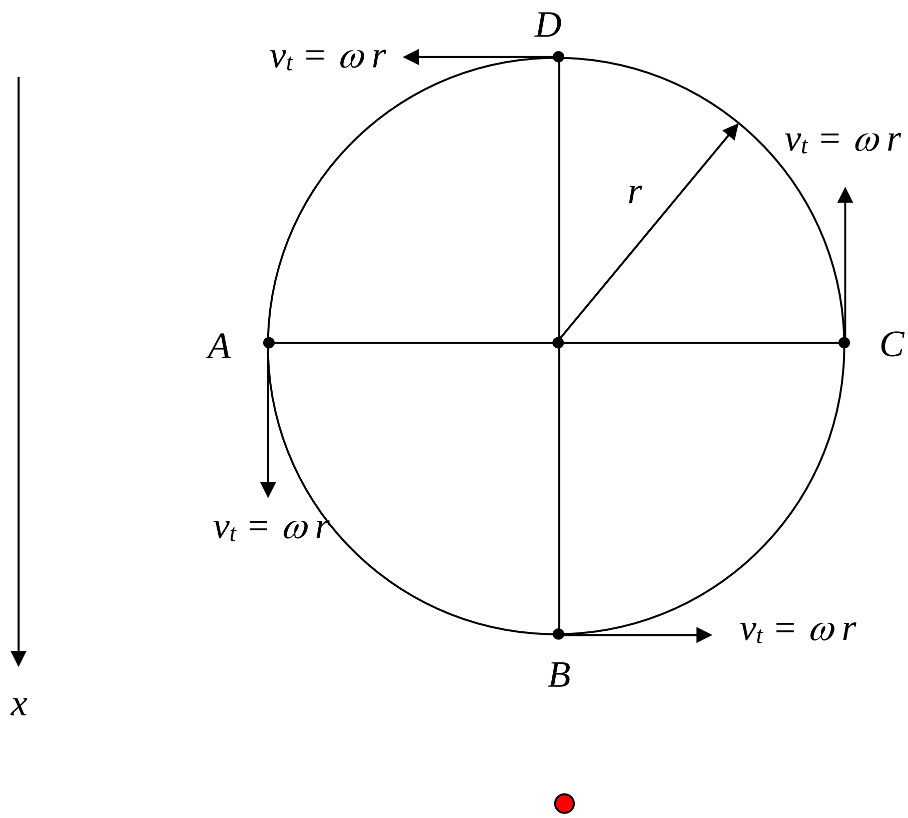
Note that for a fixed radius rotor, the tangential speed v_t is linearly proportional to the angular frequency ω. Design-wise, for a fixed angular frequency ω the tangential speed v_t is linearly proportional to the rotor radius *r* – hence using a larger diameter rotor will give a larger Doppler effect than a smaller diameter one at a given/fixed angular frequency.



Observer position (far from rotating sound source)

When a rotating sound source of finite radial size *r* is oriented such that it is instantaneously moving directly towards or directly away from a (distant) observer (sound source points *A* and *C*, respectively in the above diagram), the Doppler shift formula a.) and b.) as given above apply at those instants:

At point *A* (source moving directly towards a distant, stationary observer):

$$f_{observer}^{A} = \left(\frac{V_{medium} + U_{observer}}{V_{medium} - U_{source}}\right) f_{source} = \left(\frac{V_{air} + 0}{V_{air} - v_{t\,source}}\right) f_{source} = \left(\frac{V_{air}}{V_{air} - \omega_{source} r}\right) f_{source} > f_{source}$$

At point *C* (source moving directly away from a distant, stationary observer):

$$f_{observer}^{C} = \left(\frac{V_{medium} + U_{observer}}{V_{medium} - U_{source}}\right) f_{source} = \left(\frac{V_{air} + 0}{V_{air} + v_{t\,source}}\right) f_{source} = \left(\frac{V_{air}}{V_{air} + \omega_{source} r}\right) f_{source} < f_{source}$$