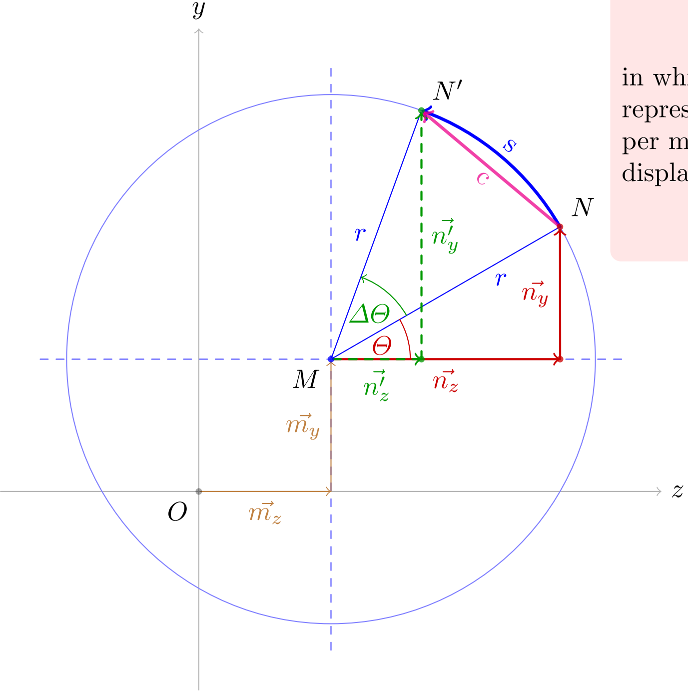

The known Cartesian coordinates of the points M, and N are

$$M = \begin{pmatrix} m_y \\ m_z \end{pmatrix}, \; N = \begin{pmatrix} n_1 \\ n_2 \end{pmatrix} = \begin{pmatrix} m_y + n_y \\ m_z + n_z \end{pmatrix}$$

in which M is the center of rotation and N a node of the mesh representing the turbine blades. Given a number of rotations per minute, e.g. rpm $= 10\,\mathrm{min}^{-1}$, the angular velocity ω and displacement $\Delta\Theta$ are computed by

$$\omega = 2\pi \cdot \mathrm{rpm}, \quad \Delta\Theta = \omega \Delta t$$

Within Δt seconds, a node N moves with an angular velocity ω along a circular arc s to it's position in N'. To compute the coordinates of N', we first compute the radius r and current angle Θ in the polar coordinate system.

$$r = \sqrt{{n_y}^2 + {n_z}^2}, \quad \Theta = \arcsin\left(\frac{n_y}{r}\right).$$

Via simple trigonometrical functions we can then derive the coordinates of the destination N'.

$$n_y' = r \cdot \sin\left(\Theta + \Delta\Theta\right), \quad n_z' = r \cdot \cos\left(\Theta + \Delta\Theta\right)$$

Thus the coordinates of N' in the Cartesian coordinate system are

$$N' = \begin{pmatrix} n_1' \\ n_2' \end{pmatrix} = \begin{pmatrix} m_y + n_y' \\ m_z + n_z' \end{pmatrix}$$