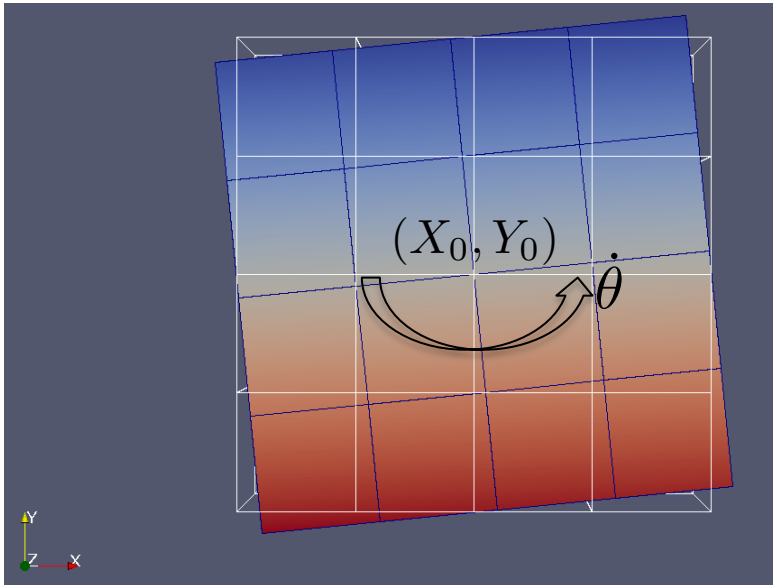
Torsion of an elastic cube

Remark:

1. Torsion applied through Dirichlet type B.C. (displacement controlled)
2. Axis of rotation: Z-axis
3. Center of rotation: (X_0, Y_0)
4. Rotation rate: $\dot{\theta}$



Boundary condition for the cube example:

@ z = 0: $u_x = u_y = u_z = 0$

@ z = L:
$$\begin{bmatrix} u_x \\ u_y \end{bmatrix} = \begin{bmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} - \begin{bmatrix} x \\ y \end{bmatrix}$$

$u_z = 0$

where

$x = X - X_0$ $\quad\quad$ $\theta = \dot{\theta} t$

$y = Y - Y_0$ $\quad\quad$ *t* is current time