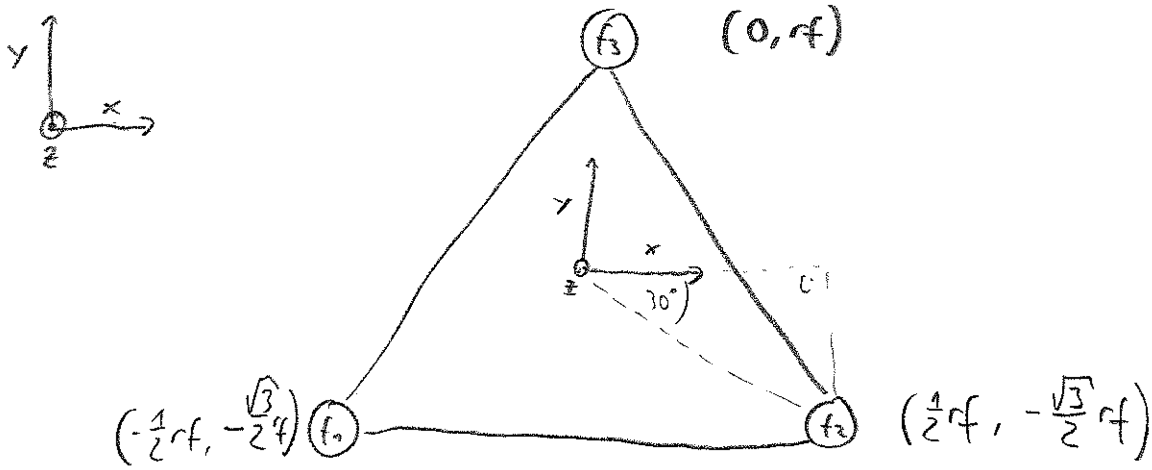
1.7.2015



$$\uparrow F_z: \quad m \cdot \ddot{z} = f_1 + f_2 + f_3$$

$$\circlearrowleft M_x: \quad \Theta_x \cdot \ddot{\varphi}_x = M_{1x} + M_{2x} + M_{3x} = -\frac{\sqrt{3}}{2} rf \cdot f_1 - \frac{\sqrt{3}}{2} rf \cdot f_2 + rf \cdot f_3$$

$$\circlearrowleft M_y: \quad \Theta_y \cdot \ddot{\varphi}_y = M_{1y} + M_{2y} + M_{3y} = \frac{1}{2} rf \cdot f_1 - \frac{1}{2} rf \, f_2 + 0 \cdot f_3$$

In Matrixschreibweise

$$\underbrace{\begin{bmatrix} m & 0 & 0 \\ 0 & \Theta_x & 0 \\ 0 & 0 & \Theta_y \end{bmatrix}}_{M} \cdot \begin{bmatrix} \ddot{z} \\ \ddot{\varphi}_x \\ \ddot{\varphi}_y \end{bmatrix} = \begin{bmatrix} 1 & 1 & 1 \\ -\frac{\sqrt{3}}{2} rf & -\frac{\sqrt{3}}{2} rf & rf \\ \frac{1}{2} rf & -\frac{1}{2} rf & 0 \end{bmatrix} \cdot \begin{bmatrix} f_1 \\ f_2 \\ f_3 \end{bmatrix}$$

Achtung: ! Gleichung gilt nur für kleine Winkel φ_x, φ_z