Given a hexacopter as shown in the figure, please find

1. its allocation matrix. $\begin{bmatrix} f \\ \tau_x \\ \tau_y \\ \tau_z \end{bmatrix} = M \begin{bmatrix} f_1 \\ f_2 \\ \vdots \\ f_6 \end{bmatrix}.$

2. its allocation matrix. $\begin{bmatrix} f \\ \tau_x \\ \tau_y \\ \tau_z \end{bmatrix} = M \begin{bmatrix} \omega_1^2 \\ \omega_2^2 \\ \vdots \\ \omega_6^2 \end{bmatrix}$

(Note that the drag torque factor and the thrust force coefficient is $C_{\tau f}$ and k_f.)