Theory:

Equation of motion excluding damping forces

$m\ddot{u}$ + ku= – m$\ddot{u}_g$

For two way unsymmetrical system;

$$\begin{pmatrix} m & 0 & 0 \\ 0 & m & 0 \\ 0 & 0 & I_o \end{pmatrix} \begin{Bmatrix} \ddot{u}_x \\ \ddot{u}_y \\ \ddot{u}_\theta \end{Bmatrix} + \begin{pmatrix} k_{xx} & 0 & k_{x\theta} \\ 0 & k_{yy} & k_{y\theta} \\ k_{\theta x} & k_{\theta y} & k_{\theta\theta} \end{pmatrix} \begin{Bmatrix} u_x \\ u_y \\ u_\theta \end{Bmatrix} = -\begin{Bmatrix} m\ddot{u}_{gx}(t) \\ m\ddot{u}_{gy}(t) \\ I_0\ddot{u}_{g\theta}(t) \end{Bmatrix}$$

Where

$$I_0 = \frac{m(b^2+d^2)}{12}$$

$$k_{xx} = k_1 + k_3$$

$$k_{yy} = k_2 + k_4$$

$$k_{x\theta} = k_{\theta x} = (k_3 x_3 - k_1 x_1)$$

$$k_{y\theta} = k_{\theta y} = (k_4 x_4 - k_2 x_2)$$

$$k_{\theta\theta} = k_3 {x_3}^2 + k_1 {x_1}^2 + k_4 {x_4}^2 + k_2 {x_2}^2$$

If the system is symmetric about x-axis then $k_{x\theta} = k_{\theta x} = 0$

If the system is symmetric about y-axis then $k_{y\theta} = k_{\theta y} = 0$