$$\frac{d}{dt}\begin{pmatrix}\Delta u\\ \Delta w\\ \Delta q\\ \Delta\theta\end{pmatrix} = \begin{pmatrix} X_u & X_w & 0 & -g\cos(\theta_0) \\ Z_u & Z_w & u_0 & -g\sin(\theta_0) \\ M_u + M_{\dot{w}}Z_u & M_w + M_{\dot{w}}Z_w & M_{\dot{q}} + M_{\dot{w}}u_0 & M_{\dot{w}}g\sin(\theta_0) \\ 0 & 0 & 1 & 0 \end{pmatrix}\begin{pmatrix}\Delta u\\ \Delta w\\ \Delta q\\ \Delta\theta\end{pmatrix} + \begin{pmatrix} X_\delta & X_{\delta_T} \\ Z_\delta & Z_{\delta_T} \\ M_\delta + M_{\dot{w}}Z_\delta & M_{\delta_T} + M_{\dot{w}}Z_{\delta_T} \\ 0 & 0 \end{pmatrix}\begin{pmatrix}\Delta\delta\\ \Delta\delta_T\end{pmatrix}$$