1 Teoria de IO Linealizacion

$$f(x) = \begin{bmatrix} L_f^{r1} h_1 \\ \vdots \\ L_f^{rp} h_p \end{bmatrix}$$

$$G(x) = \begin{bmatrix} L_{g1}\left(L_f^{r_1-1} h_1\right) & \dots & L_{gp}\left(L_f^{r_1-1} h_1\right) \\ \vdots & \ddots & \vdots \\ L_{g1}\left(L_f^{r_p-1} h_p\right) & \dots & L_{gp}\left(L_f^{r_p-1} h_p\right) \end{bmatrix}$$

$$f(x) = \begin{bmatrix} L_f^2 x_1 \\ L_f^2 x_2 \\ L_f^2 x_3 \\ L_f^2 x_9 \end{bmatrix} = \begin{bmatrix} L_f x_4 \\ L_f x_5 \\ L_f x_6 \\ L_f x_{12} \end{bmatrix} = \begin{bmatrix} -0.77 * x_5 * x_6 \\ +0.78 * x_4 * x_6 \\ -0.011 * x_5 * x_4 \\ 0 \end{bmatrix}$$

$$G(x) = \begin{bmatrix} L_{g1}\left(L_f^1 h_1\right) & L_{g2}\left(L_f^1 h_1\right) & L_{g3}\left(L_f^1 h_1\right) & L_{g4}\left(L_f^1 h_1\right) \\ L_{g1}\left(L_f^1 h_2\right) & L_{g2}\left(L_f^1 h_2\right) & L_{g3}\left(L_f^1 h_2\right) & L_{g4}\left(L_f^1 h_2\right) \\ L_{g1}\left(L_f^1 h_3\right) & L_{g2}\left(L_f^1 h_3\right) & L_{g3}\left(L_f^1 h_3\right) & L_{g4}\left(L_f^1 h_3\right) \\ L_{g1}\left(L_f^1 h_4\right) & L_{g2}\left(L_f^1 h_4\right) & L_{g3}\left(L_f^1 h_4\right) & L_{g4}\left(L_f^1 h_4\right) \end{bmatrix}$$

$$= \begin{bmatrix} L_{g1} x_4 & L_{g2} x_4 & L_{g3} x_4 & L_{g4} x_4 \\ L_{g1} x_5 & L_{g2} x_5 & L_{g3} x_5 & L_{g4} x_5 \\ L_{g1} x_6 & L_{g2} x_6 & L_{g3} x_6 & L_{g4} x_6 \\ L_{g1} x_{12} & L_{g2} x_{12} & L_{g3} x_{12} & L_{g4} x_{12} \end{bmatrix}$$

$$= \begin{bmatrix} 10 & 0 & 0 & 0 \\ 0 & 10 & 0 & 0 \\ 0 & 0 & 5.8 & 0 \\ 0 & 0 & 0 & 0.29 * cos(x_2) * cos(x_1) \end{bmatrix}$$

$$G^{-1}(x) = \begin{bmatrix} 0.1 & 0 & 0 & 0 \\ 0 & 0.1 & 0 & 0 \\ 0 & 0 & 0.172 & 0 \\ 0 & 0 & 0 & \frac{3.45}{(cos(x_2) * cos(x_1))} \end{bmatrix}$$