Example 2.12. Obtain a set of linear matrix inequalities (LMIs) that ensures the robust $\mathcal{H}_\infty$ stability of

$$\begin{cases} \dot{x}(t) = (A + \Delta A)x(t) + Nw(t) \\ z(t) = Gx(t). \end{cases}$$

Simulation report: Recall Example 2.2 in Chap.1, which addresses the state-space model of a dc servomotor. The parameter values are configured as follows:

$$R_a = 5.385,\ L_a = 3.694 \times 10^{-3},\ K_T = K_\theta = 0.0583$$
$$J = 6.88627 \times 10^{-6},\ B = 3.1346 \times 10^{-5}\ \pm 20\%.$$

Note that B (:$\sim$ viscous friction coefficient) has an uncertainty of $\pm 20\%$. Using the LMIs obtained in Example 2.12, for

$$N = \begin{bmatrix} 0.1 \\ 0.01 \\ 0 \end{bmatrix},\ G = \begin{bmatrix} 1 & 0 & 0 \end{bmatrix}$$

(1) **find** the minimum value of γ (i.e., $\mathcal{H}_\infty$ performance level) through the utilization of MATLAB, and (2) **report** the overall process.