

- (State Feedback and State Estimation)

- 1 (A RLRC circuit)

After applying feedback, we have the new coefficient matrix

$$\mathbf{A} + \mathbf{l}\mathbf{c} = \begin{bmatrix} a & b + l_1 \\ c & d + l_2 \end{bmatrix}.$$

Next we want to make sure the observer is stable. The characteristic polynomial is

$$\Delta(s) = s^2 - s(d + l_2 + a) + (ad + al_2 - cb - cl_1).$$

Therefore the feedback system will be **stable** if

$$l_2 < -(a + d)$$

and, because $a < 0$,

$$l_2 < \frac{c}{a}l_1 + \frac{cb - ad}{a}.$$

The feasible region is shown in the following.

