

communication, including the classic uncertainty model [1]. We conclude in Section 5.

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II. YOULA-KUCERA PARAMETERIZATION

In this paper, we consider a feedback inter-connection of two plants G_{22} and K having lower triangular structure as shown in Figure (2). Though the problem is generalized for n -nest systems for convenience of presentation, the system consists of a plant G_1 and a controller K (subsystem) consists of a plant G_2 and a controller K . The inner and outer subsystems are connected such that information can be transmitted in both directions. The nominal plants G_1 and G_2 are connected so that the control action on G_1 is u_1 and u_2 and measured outputs are y_1 and y_2 . G_{22} has a lower triangular structure imposed on the controller K . This can be written as $G_{22} = \begin{pmatrix} P_{11} & 0 \\ P_{21} & P_{22} \end{pmatrix}$, where P_{ij} is an inherited state space realization of P_{ij} is stabilizable and detectable. Then there exist stable lower triangular parameters $Y_r, M_r, X_r, N_r, Y_l, M_l, X_l, N_l$ satisfying the following identity

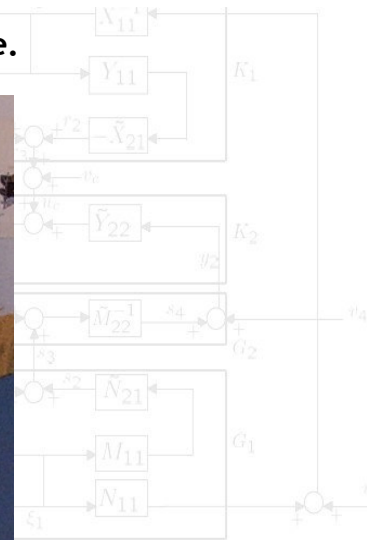


Fig. 2. Feedback inter-connection of $P = G_{22}$ and K .

Lemma 2.1: [6] Let the plant $P = G_{22}$ be stable and the controller K be stable. Then the inter-connection as shown in Figure (2) is stable if and only if the following conditions are satisfied:

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Fig. 2. Feedback inter-connection of $P = G_{22}$ and K .

This results in the parameterization of K in terms of Q having the same structure. Let Q be partitioned according to the structure of G_{22} and K as $Q = \begin{pmatrix} Q_{11} & 0 \\ Q_{21} & Q_{22} \end{pmatrix}$.