D-TE04

Robust Control Theory

15:20-17:20 **Chair : Lee Sang Hyuk(Pusan National Univ.)**
Room : 4133 **Co-Chair : Kang E-Sok(Chungnam National Univ)**

15:20 – 15:40 **D-TE04-1**

Robust and Non-fragile H∞ Output Feedback Controller Design

Cho Sang Hyun, Kim Ki Tae and Park Hong Bae
(Kyungpook National University)

In this paper, we provide the synthesis of non-fragile H∞ output feedback controllers for linear systems with affine parameter uncertainties, and dynamic output feedback controller with structural uncertainty. The sufficient condition of controller existence, the design method of robust and non-fragile H∞ output feedback controller, and the region of controllers which satisfies non-fragility are presented. Also using some change of variables and Schur complements, the obtained condition to a compact set. We show that the resulting controller guarantees the asymptotic stability and disturbance attenuation of the closed...

15:40 – 16:00 **D-TE04-2**

H∞ controller design for input-saturated linear systems

Choi Ki Hoon and Park Hong Bae
(Kyungpook National University)

In this paper, we provide the technique of H∞ controller design algorithm for input-saturated linear systems using a linear parameter varying(LPV) framework. The LPV controller with parameter dependent dynamic state feedback controller concept guarantees the asymtotic stability and H∞ norm bound within prescribed level γ using the saturation nonlinearity as scheduling parameters. Especially, the sufficient conditions for the existence of H∞ controller are formulated in terms of linear matrix inequalities(LMIs) that can be solved very efficiently.

16:00 – 16:20 **D-TE04-3**

State--Feedback Guaranteed-Cost Controllers for Systems with Controller Gain Variation

Park Sung-Wook and Oh Jun-Ho
(KAIST)

This paper addresses the design of State-feedback Robust Guaranteed-Cost Controllers with controller gain variations. Since the unstructured uncertainty is the most dominant uncertainty in the modeling of the plant, the plant is assumed to have the unstructured uncertainty. It is necessary to take the controller parameter perturbation into consideration when we design the robust controller. Otherwise, the resulting controller may show the fragility property. That is to say, the extremely small controller parameter variation may result in the instability of the overall closed-loop system. Therefore, the design purpose is that the maximum performance index is guaranteed in the presence of the unstructured plant uncertainty and controller parameter variations...

16:20 – 16:40 **D-TE04-4**

The design of the robust hybrid controller for the construction using an active dynamic vibration absorber

Lee Sangkyu, Lee Jin Ho and Hwang I Cheol
(KAIST)

This paper designs the robust hybrid controller for the multi-degree-of-freedom system having uncertainty caused by modeling error and disturbances. The controlled plant is the construction which has an active dynamic vibration absorber on the top and is excited by the El Centro earthquake at the base. The active controller designed by the LQR(Linear Quadratic Regulator) and H-infinity control theory. The robustness of the hybrid H∞ controller is compared with that of the hybrid LQ controller from computer simulation.

16:40 – 17:00 **D-TE04-5**

Robust ILQ controller design of hot strip mill looper system

Seong Bae Kim and I Cheol Hwang
(Dong-Eui Univ.)

In this paper, we study design of a ILQ(Inverse Linear Quadratic optimal control) looper control system for hot strip mills. The looper which is placed between stands plays an important role in controlling strip width by regulating strip tension variation generated from the velocity difference of main work rolls. A Looper servo controller is designed by ILQ control theory which is an inverse problem of LQ(Linear Quadratic optimal control) control. The mathematical model for looper system is obtained by Taylor's linearization of nonlinear differential equations. Then we designed linear controller for linearization model by using the ILQ control algorithm. Thereafter this controller is applied to the nonlinear model for model identification. As a result, we show the controller's robustness for the model error, external disturbance and sensor noise.