

## System Analysis Laboratory



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Professor

In FY2013, a member, Dr. Mori, of the System Analysis Laboratory mainly, investigates to develop the theory of the two-stage compensator designs and the strong stabilizability.

The two-stage compensator designs for multi-input multi-output plants as well as single-input single-output plants are investigated.

We have developed various types of alternative two-stage compensator designs. In the standard feedback system, we have two input vectors and two output vectors. From them, we have nine types of two-stage compensator designs, which is in a sense "partial" feedback. They do not assume the coprime factorizability, The results of our research are also based on the factorization approach only, so that they can be applied to numerous linear systems.

Dr. Mori is further developing a visualization system of the two-stage compensator designs for SISO discrete-time LTI systems, so that we can view how the the two-stage compensator designs work.

Dr. Mori also investigate the strong stabilizability without assuming coprime factorizability. We have developed a parametrization method using a strong stabilizing controller. We show that the number of parameters may be reduced.

As previously, a member, Dr. Mori, held public lectures for building a personal computer in University of Aizu. The public lectures held three times. He also held a lecture for high school students at Tajima High School.

## Summary of Achievement

### Refereed Journal Papers

[k-mori-01:2013] K. Mori. Parametrization of Stabilizing Controllers with a Strong Stabilizing Controller without Coprime Factorizability. *International Journal of Systems Engineering Modeling and Analysis*, 7:57–61, 2013.

In this paper, we investigate strongly stabilizable. If the plants admits the coprime factorizability, by using Youla-Kučera-parametrization, we can obtain all stabilizing controllers. But for the plants cannot admit the coprime factorizability, the Youla-Kučera-parametrization is not applicable. The author has developed the parametrization method of stabilizable plants without coprime factorizability. In this paper, we apply his results to strongly-stabilizable plants. Then, we show that, for the parametrization of all stabilizing controllers, the number of parameters are reduced.

### Unrefereed Papers

[k-mori-02:2013] K. Mori. Full and Partial Parametrizations of Stabilizing Controllers with Two-Stage Compensator Designs. In *Proceedings of the 9th Asian Control Conference (ASCC 2013)*, pages 72–76, Istanbul, Turkey, June 2013.

[k-mori-03:2013] K. Mori. A Relationship between Two Stabilizing Controllers and Its Application to Two-Stage Compensator Design without Coprime Factorizability — Single-Input Single-Output Case —. In *Proceedings of International Conference on Theoretical and Applied Mechanics (IC-TAM 2013)*, pages 72–76, New York, USA, June 2013.