

System Analysis Laboratory



Kazuyoshi Mori
Professor

In FY2014, a member, Dr. Mori, of the System Analysis Laboratory mainly, continues to investigate the theory of the two-stage compensator designs. He also investigated the visualization system for two-stage compensator designs with his graduated students.

The two-stage compensator designs for multi-input multi-output plants as well as single-input single-output plants are investigated. We have also investigated the reduction of the parameterization of two-stage compensator designs.

Visualization system we have developed is based on Mathematica. This system can display the relationship between the input and output signals. The system supports multi-input multi-output plants as well as single-input single-output plants. In FY2014, we have consider the discrete-time LTI systems as a model. We have employed two methods; one is an animation system with parameter and the other is an graphical system with the slider for parameters. The system also presents the norm of the signals, so that optimization will be investigated.

Dr. Mori also investigates the number of parameters of stabilizing controllers based on the factorization approach. He present an interesting model. In this model, there exists a plant that admits only one-side coprime factorization such that the number of the plant is between nm between $(n + m)^2$, where n and m denote the numbers of outputs and inputs, respectively.

As previously, a member, Dr. Mori, held public lectures for building a personal computer in University of Aizu. The public lectures held three times.

Summary of Achievement

Refereed Journal Papers

- [k-mori-01:2014] K.MORI. General Parametrization of Stabilizing Controllers with Doubly Coprime Factorizations over Commutative Rings. *IAENG International Journal of Applied Mathematics*, 44(4):(Advance online publication: 28 November 2014), 2014.

Refereed Proceeding Papers

- [k-mori-02:2014] K.MORI. Examples of Parameterization of Stabilizing Controllers with One-Side Coprime Factorization. In *International Conference on Electrical, Computer, Electronics and Communication Engineering*, pages 309–312, 3 2015.
- [k-mori-03:2014] K.MORI. General Parameterization of Stabilizing Controllers with Coprime Factorizations. In *Proceedings of the 2014 International Conference of Applied and Engineering Mathematics*, pages 755–758, 7 2014.
- [k-mori-04:2014] K.HASHIMOTO and K.MORI. Visualization of Input-Output Relation of SISO/MIMO Systems Using Parametrization of Two-Stage Compensator Design. In *Proceedings of the IASTED International Conference Modelling, Identification and Control (MIC 2015)*, pages 172–179, 2 2015.

Unrefereed Papers

- [k-mori-05:2014] K.HASHIMOTO and K.MORI. Visualization of The Input-Output Relation of Multi-Input Multi-Output System Using Parametrization of Two-Stage Compensator Design. In *Proceedings of the 2014 Tohoku-Section Joint Convention of Institutes of Electrical and Information Engineers*, page 2F01, 8 2014.

Academic Activities

- [k-mori-06:2014] K.MORI, 2014.

Summary of Achievement

Dr. Mori is a program committee member of 50 years anniversary memorial conference of The Society of Instrument and Control Engineers Tohoku Chapter.

[k-mori-07:2014] Dr. Mori is a reviewer of IEEE Trans. Automatic Control, IET Control Theory, and Applications, 2014.