I-TA05

Identification and Estimation 1

08:30-10:30 **Chair : Harada Hiroshi(Kumamoto Univ.)**
Room : C204 **Co-Chair : Park Pu Kyun (POSTECH)**

08:30 – 08:50 **I-TA05-1**

Identification of System from Generalized Orthogonal Basis Function Expansions

Chul-Min BAE, Kiyoshi WADA
(Kyushu Univ.)

In this paper, we will expand and generalize the orthogonal functions as basis functions for dynamical system representations. The orthogonal functions can be considered as generalizations of, for example, the pulse functions, Laguerre functions, and Kautz functions, and give rise to an alternative series expansion of rational transfer functions. It is shown how we can exploit these generalized basis functions to increase the speed of convergence in a series expansion. The set of Kautz functions is descussed in detail and, using the power-series equivalence, the truncation error is obtained. And so we will present the influesce of noises to use Kautz function on the identification accuracy.

08:50 – 09:10 **I-TA05-2**

Identification of Polymerization Reactor Using Third Order Volterra Kernel Model

Motoki NUMATA, Hiroshi KASHIWAGI, Hiroshi HARADA
(Kumamoto Univ.)

It is known that Volterra kernel model can represent a wide variety of nonlinear chemical processes. But almost all Volterra kernel models which appeared in the literature are up to second order, because it was difficult to measure higher order Volterra kernels. Kashiwagi has recently shown a method for measuring Volterra kernels up to third order using pseudorandom M-sequence signals. In this paper, the authors verified the applicability of this method for chemical processes using polymerization reactor simulation. Also, the authors have recently proposed a practical identification method for chemical processes, which is based on the combination of off-line nonlinear identification and on-line linear identification. This method is also applied to the identification of polymerization reactor, and we obtained ...

09:10 – 09:30 **I-TA05-3**

Identification of Volterra Kernels of Nonlinear Van de Vusse Reactor

Hiroshi KASHIWAGI, Li RONG
(Kumamoto Univ.)

Van de Vusse reactor is known as a highly nonlinear chemical process and has been considered by a number of researchers as a benchmark problem for nonlinear chemical process. Various identification methods for nonlinear system are also verified by applying these methods to Van de Vusse reactor. From the point of view of identification, only the Volterra kernel of second order has been obtained until now. In this paper, the authors show that Volterra kernels of nonlinear Van de Vusse reactor of up to 3rd order are obtained by use of M-sequence correlation method. A pseudo-random M-sequence is applied to Van de Vusse reactor as an input and its output is measured. Taking the crosscorrelation function between the input and the output, we obtain up to 3rd order Volterra kernels, which is ...

09:30 – 09:50 **I-TA05-4**

New observer design for Linear Systems with Unknown Inputs : Dynamic UIO

Chan-Hoi Kim and Jong-Koo Park
(Sungkyunkwan Univ.)

This paper proposes a dynamic observer that is applicable to linear time-invariant systems subject to unknown inputs. The proposed method utilizes the output feedback control structure to design an unknown input observer. We name it as the dynamic unknown input observer(UIO). The dynamic UIO can be designed easily compared to the usual static UIO, and the system response could be improved.

09:50 – 10:10 **I-TA05-5**

A New Convolutional Weighting Function Method for Continuous-time Parameter Identification

Hyun Seob Choi and PooGyeon Park
(Pohang Univ.)

This paper proposes a new approach to identifying the unknown parameters of continuous LTI systems. For parameter identification in continuous-time systems, the Linear Integral Filter (LIF) method generally has been used in the beginning. Especially, one of the most efficient LIF methods in the literature is to use a weighting function satisfying specific three constraints. In high order systems, even though the weighting function satisfies the three constraints, it is impossible to identify the exact parameters of the systems because of information loss arising from a great amount of magnitude differences among the weighting function and its high-order derivatives. This paper, using an LMI technique, shows the limitation in designing the weighting function of the existing methods, and ...

10:10 – 10:30 **I-TA05-6**

Self-Structuring Radial-Basis Function Network for Identification of Uncertain Nonlinear Systems

Jae-Choon Jun, Jang-Hyun Park, Pil-Sang Yoon, Gwi-Tae Park
(Korea Univ.)

In this paper we introduce a new algorithm that enables radial-basis function network(RBFN) to be structured automatically and guarantees the stability of the RBFN. Because this new algorithm is efficient and also have the advantage of fast computational speed we adopt this algorithm as on-line learning scheme for uncertain nonlinear dynamical systems. Based on the fact that a 3-layered RBFN can represent a specific nonlinear function reasonably well by linearly combining a set of nonlinear and localized basis functions, we show that this RBFN can identify the nonlinear system very well without knowing the information of the system in advance.