

# FP06

## Sensors and Instrumentation II

13:30-15:30

Room : 1st Floor-Brahms

Chair1 : Hiroshi Kashiwagi ( Kumamoto Univ., Japan )

Chair2 : Zhongwei Jiang ( Yamaguchi Univ, Japan )

13:30 – 13:50

FP06-1

### A Few Applications of Polarity Correlation Method in a Frame of Deterministic Signals

Kimio Sasaki(Univ. of Tsukuba, JAPAN), Mariko Ikeda(IBM, Japan Ltd., JAPAN)

Polarity correlation is a simplified version of the usual, having a possibility of real-time processing without any reduction of precision. In this paper, its applicability in deterministic signals is first explored generally, by theoretical or numerical analysis of four kinds of the typical signals. Then, based on the results, its two applications are proposed, that are detection and demodulation of FSK signals in digital communication, and time delay estimation in ultrasonic A-mode measurement. The effectiveness of the proposed applications is confirmed by its superior implementation ability and the results of numerical experiments under practical circumstances.

13:50 – 14:10

FP06-2

### Length of Conductive Measurement Based-on Basic Theory

Lerdlekha Tanachaikhan(Ramkhamhaeng Univ., THAILAND), Witsarut Sriratana, Sart kumool(KMITL, THAILAND)

- Contents 1 Abstract
- Contents 2 Introduction
- Contents 3 Design of the system
- Contents 4 System testing
- Contents 5 Conclusions
- Contents 6 References

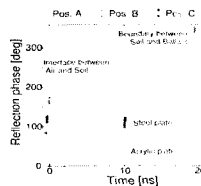
14:10 – 14:30

FP06-3

### Buried Object Discrimination with Reflection Phase Characteristics for Microwave Subsurface Radar

Masayuki TANAKA, Jun-ya TAKAYAMA, Shinji OHYAMA, Akira KOBAYASHI(Tokyo Institute of Tech., JAPAN)

- Introduction
- Microwave subsurface radar
- Reflection phase
- Experimental
- Conclusion



14:30 – 14:50

FP06-4

### Properties of Two-dimensional M-transform with Applications to Image Processing

Hiroshi Kashiwagi, Hiroshi Harada, Teruo Yamaguchi, Toshiyuki Andoh(Kumamoto Univ., JAPAN)

- 1 . Review of one dimensional M-transform
- 2 . Definition of two dimensional(2D )M-transform
- 3 . Properties of 2D M-transform
- 4 . Mean, Autocorrelation
- 5 . Crosscorrelation of input and output of a system
- 6 . Application to fault detection of mechanical shape

14:50 – 15:10

FP06-5

### Detection and Diagnosis of Sensor Faults for Unknown Sensor Bias in PWR Steam Generator

Bong Seok Kim, Sook In Kang, Yoon Joon Lee, Kyung Youn Kim(Cheju Nat'l Univ., KOREA), In Soo Lee(Sangju Nat'l Univ., KOREA), Jung Taek Kim, Jung Woon Lee(KAERI, KOREA)

The measurement sensor may contain unknown bias in addition to the white noise in the measurement sequence. In this paper, fault detection and diagnosis scheme for the measurement sensor is developed based on the adaptive estimator. The proposed scheme consists of a parallel bank of Kalman-type filters each matched to a set of different possible biases, a mode probability evaluator, an estimate combiner at the outputs of the filters, a bias estimator, and a fault detection and diagnosis logic. Monte Carlo simulations for the PWR steam generator in the nuclear power plant are provided to illustrate the effectiveness of the proposed scheme.

15:10 – 15:30

FP06-6

### Looseness Estimation of Bolts on Truss Structure with PZT Patches

Zhongwei Jiang, Yasutaka Akeuchi(Yamaguchi University)

This work presents a study on development of a practical and quantitative technique for assessment of the healthy state of a structure by piezoelectric impedance-based technique associated with longitudinal wave propagation measuring method. A truss structure embedded with piezoelectric patches is investigated for a fundamental study on estimation of the looseness of bolts in the joint. In order to evaluate the minute mechanical impedance change due to loosening bolt, a harmonic longitudinal elastic wave is applied to the structure by a pair of PZT patches and their electric impedance is measured simultaneously. According to the experimental results, the change of the electric impedance of P...