D-TMP01 Domestic Poster Session

13:00-13:50 **Chair : Han Chang Soo (Hanyang Univ.)**
Room : Terrace(3F) **Co-Chair : Kim Jeong-Ha (Kookmin Univ.)**

13:00 – 13:50 **D-TMP-13**

Robust Speed Controller of Induction Motor using Neural Network-based Self-Tuning Fuzzy PI-PD Controller

Sang-Min Kim, Chung-Jin Kwon, Chang-Goo Lee, Sung-Joong Kim
(Chonbuk National Univ.), Woo-Youn Han (Chonju Univ.),
Dong-Youn Shin (Cheju Hanra Univ.)

This paper presents a neural network based self-tuning fuzzy PI-PD control scheme for robust speed control of induction motor. The PID controller is being widely used in industrial applications. When continuously used long time, the electric and mechanical parameters of induction motor change, degrading the performance of PID controller considerably. This paper re-analyzes the fuzzy controller as conventional PID controller structure, and proposes a neural network based self-tuning fuzzy PI-PD controller whose scaling factors are adjusted automatically. Proposed scheme is simple in structure and computational burden is small.....

13:00 – 13:50 **D-TMP-14**

Observer Based Sliding Mode Controller for Nonlinear System using Dynamic Rule Insertion

Ho-Joon Seo, Dong-sik Kim (Soonchungyang Univ.),
Sam-Jun Seo (Anyang Univ.),
Jang-Hyun Park, Gwi-Tae Park (Korea Univ.)

In the adaptive fuzzy sliding mode control, from a set of fuzzy IF-THEN rules adaptive fuzzy sliding mode control whose parameters are adjusted on-line according to some adaptation laws is constructed for the purpose of controlling the plant to track a desired trajectory. Most of the research works in nonlinear controller design using fuzzy systems consider the affine system with fixed grid-rule structure based on system state availability. The fixed grid-rule structure makes the order of the controller big unnecessarily, hence the on-line fuzzy rule structure and fuzzy observer based adaptive fuzzy sliding mode controller is proposed to solve system state availability problems. Therefore adaptive laws of fuzzy parameters .....

13:00 – 13:50 **D-TMP-15**

The Vibration Control of Flexible Manipulator using A Reference Trajectory Command and Fuzzy Controller

Yang-Su Park, Jeng-Ho Kang (Kyung Nam College)
Yoon-Myung Park (Dong-A Univ.)
Yong-Gab Cho (Moonkyong Univ.)

A fuzzy control strategy is described which is utilized to control the joint angle and tip deflection in single flexible manipulator. In this paper, an existing model for a single flexible manipulator is used for the initial development of an FLC. One FLC is designed to govern the joint angle of the manipulator as it is rotated from one position to another, and a second FLC is designed to attenuate the tip deflection which result from joint angle body motion. Reference Trajectory Command is an important method to reduce vibration in flexible beam. This paper presents a very simple command control shaping which eliminates multiple mode residual vibration in a flexible beam combined fuzzy controller.....

13:00 – 13:50 **D-TMP-16**

An Implementation of Mutual Tuning Controller for Position Control of Multiple Hydraulic Cylinders

Jin-Gyu Kim, Jang-HO Park, Gi-Seok Ryu, Hyo-Sik Choi,
Jong-ok Lim, Jong-Hwa Kim
(Korea Maritime Univ.)

In order to push or pull a heavy weight structure, the positions of multiple hydraulic cylinders participated on must be tuned sumultaneously. To do this, it is necessary to control the position of each hydraulic cylinder through mutual tuning controller. In this paper, a tuning control of multiple hydraulic cylinders is introduced under the assumption that each position controller for each cylinder is used.

13:00 – 13:50 **D-TMP-17**

A State Space Analysis on the Stability of Periodic Orbit Predicted by Harmonic Balance

Sung Sangkyung , Lee Jang Gyu (Seoul National Univ.)
Kang Taesam (Konkuk Univ.)

A closed loop system with a linear plant and nonlinearity in the feedback connection is analyzed for its quasi-static orbital stability by a state-space approach. First a periodic orbit is assumed to exist in the loop which is determined by describing function method for the given nonlinearity. This is possible by selecting a proper nonlinearity and a rigorous justification of the describing function method.[1-3,18,20] Then by introducing residual operator, a linear perturbed model can be formulated. Using various transformations like a modified eigenstructure decomposition, periodic-averaging, change of variables and coordinate transformation, the stability of the periodic orbit, as a solution of harmonic balance, can be shown by investigating a simple scalar function and result of linear algebra. This is .....

13:00 – 13:50 **D-TMP-18**

Nonlinear Attitude Control of a Two-Wheeled Mobile Robot

JI-Won Yang, Chi-Won Roh, Kwang-Won Lee
(Ajou Univ.)

In this paper, we present an attitude control of self-standing for a two-wheeled inverted-pendulum-like mobile robot based on the nonlinear control theory. Nonlinear dynamic equations are linearized by using the Lie derivative, and a pole placement controller is designed. Characteristics of the controller are examined by numerical simulations to show the self-standing attitude of the mobile robot in standing and in moving.