Chemical Process Control/Automation

08:30-10:30

Optimal Grade Transition with Partially Structured Model in a Slurry-Phased HDPE Reactor by Modified Hierarchical Dynamic Optimization
Heui-Seok Yi, Chonghun Han (POSTECH), Sang-Seop Na and Jinsuk Lee (Samsung General Chemical Co., Ltd)

Dynamic optimization with partially structured model in a slurry-phase HDPE reactor is implemented by the modified hierarchical dynamic optimization. Optimal trajectories of MI and density of HDPE are calculated as controlled variables and optimal profiles of the concentrations of ethylene, hydrogen and comonomer are calculated as manipulated variables in dynamic optimization. MI, density, the concentrations of ethylene, hydrogen and comonomer are used as controlled variables and flow rates of ethylene, hydrogen and comonomer are sued as manipulated variables in control implementation. Two-level hierarchical method is applied in dynamic optimization to reduce computation time. In the upper level formulation...

09:10 - 09:30

Nonlinear Model Based Control of Two-Product Reactive Distillation Column
Myungwan Han (Chungnam National Univ.)

Nonlinear feedback control scheme for reactive distillation column has been proposed. The proposed control scheme is derived in the framework of Nonlinear Internal Model Control. The product compositions and liquid and vapor flow rates in sections of the reactive distillation column are estimated from selected tray temperature measurements by an observer. The control scheme is applied to example reactive distillation column in which two products are produced in a single column and the reversible reaction A + B = C + D occurs. The relative volatilities are favorable for reactive distillation so that the reactants are intermediated boilers between the light product C and the heavy product D. Ideal physical properties, kinetics and...

10:00-10:30

Analytical Method to Design Multiloop Control Systems via DCLR
Kim Changgeun, Daewoong Chun, Jeilae Lee(Kyungpook National Univ.), Khong Lee, Myongik Lee(Youngnam Univ.)

Although many advanced control strategies and concepts have been proposed recently, the most popular controller in the process industries is the PID controller because of its simplicity, easy implementation, and robustness. A multiloop PID controller design method using the general IMC tuning rule is presented in this paper. The IMC-PID controller is formed by combining the integral term designed by considering interactions between the individual loops with the proportional and derivative terms designed in circumstance neglecting the interactions. The multiloop PID controller designed by the proposed method can approximate the ideal multiloop controller throughout overall frequency range, and...

10:10 – 10:30

Design of Glide Slope Capture Logic Using Model Inversion
HyungSik Choi, CheolKeun Ha(Ulsan Univ.), Byounsoo Kim (Kyungsangang Univ.)

This paper deals with a design of nonlinear glide slope capture logic using dynamic model inversion in singular perturbation, which is applicable to the autoland in ILS. Aircraft dynamics are separated into the fast time-scale variables, related with the inner-loop design, and the slow time-scale variables, related with the outer-loop design. It is assumed that the aircraft starts landing at 1000ft of altitude, -2.5deg of flight path angle, and 250ft/sec of velocity. In the outer-loop design, commands of altitude and velocity are selected and thereby the pseudo-controls of power level and pitch rate are determined. Also the elevator input to the aircraft is determined in the inner-loop design. The final design is evaluated in 6 DOF simulation model of the associated aircraft, in which the actuator models are not included. The results show the satisfactory autoland...