

Chawin Taweerojkulsri 2014: Temperature Control of Thermal Cracking Furnace in Vinyl Chloride Monomer Process Using 2D PDEs-ODE Model. Master of Engineering (Chemical Engineering), Major Field: Chemical Engineering, Department of Chemical Engineering. Thesis Advisor: Assistant Professor Chanin Panjapornpon, Ph.D. 71 pages.

This work presents a new control technique for the EDC thermal cracking furnace modeled by sets of ordinary differential equation (ODE) and 2D-partial differential equations (PDEs). The dynamics of coupled 2D-PDEs-ODE model have been divided into 2 subsystems, set of state variables of the internal and external cracking coil. With the concept of input-output (I/O) linearization, these inner and outer dynamics are applied to design the setpoint tracking calculator and the approximate I/O feedback controller respectively. The tracking compensator dynamics and the finite-based, open-loop observer are integrated with the proposed controller system to compensate the model mismatch and predict the unmeasured state information. The performances of the proposed method are evaluated through the servo and regulatory tests. The results showed that the control method can effectively force the controlled output to the desired setpoints and reject the disturbance from changes of feed flow.

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Thesis Advisor's signature