

Wisuthchai Boonwatcharapunsakun 2008: Mathematical Analysis of TAP Models for Unimodal- and Bimodal-Pore-Structure Catalyst Pellets. Master of Engineering (Chemical Engineering), Major Field: Chemical Engineering, Department of Chemical Engineering. Thesis Advisor: Associate Professor Phungphai Phanawadee, D.Sc. 146 pages.

The TAP transient pulse response experiment has been used for heterogeneous catalytic reaction studies. The observable quantity in the experiment is a time-dependent exit flow rate curve. The size and the shape of the exit flow curve contain information on gas transport and chemical kinetics. New moment expressions of the exit flow rate for the unimodal- and bimodal-pore-structure catalysts are presented. The fingerprints of the exit flow rate curves for irreversible adsorption/reaction and desorption for unimodal- and bimodal porous cases were found to be similar to non-porous cases. In addition, the characteristics of the distribution of surface concentration due to irreversible adsorption in the porous catalyst pellet were analyzed. The correlation between the effectiveness factor and the distribution of fractional surface coverage in the pellets developed in an irreversible adsorption process in a TAP experiment is similar to the correlation between the effectiveness factor and gas concentration distribution in steady-state conditions.

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Thesis Advisor's signature

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