Classification of static and dynamic behavior in a fluidized-bed catalytic reactor

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Source: Chemical Engineering Journal, Volume 84, Number 3, 15 December 2001 , pp. 503-516(14)

Publisher: Elsevier

Abstract:

The singularity theory and continuation techniques are combined to classify the static and dynamic behavior of a non-isothermal gas-solid fluidized-bed catalytic reactor with consecutive exothermic reactions A->k_1B->k_2C. It is shown that the double limit variety with five solutions is the highest static singularity the model can predict. The model is also capable of predicting self sustained oscillations for a wide range of Lewis numbers. The effect of the model parameters on its static and dynamic bifurcation is analyzed. Practical criteria are also derived for the effect of the branching phenomena on the yield of the intermediate product in the reactions network.

Keywords: Static; Dynamic; Catalytic reactor