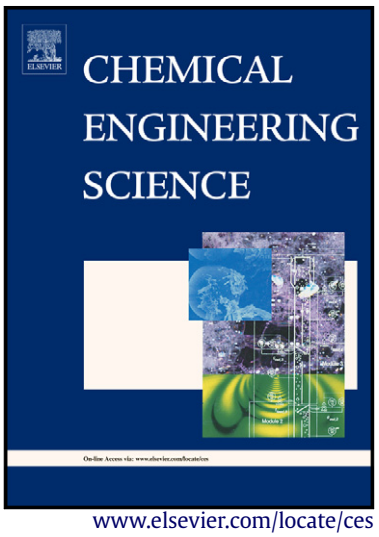

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Daliborka Nikolić, Andreas Seidel-Morgenstern, Menka Petkovska

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Nonlinear frequency response analysis of forced periodic operation of non-isothermal CSTR with simultaneous modulation of inlet concentration and inlet temperature

Daliborka Nikolić[1], Andreas Seidel-Morgenstern[2], Menka Petkovska[3,*]

[1] University of Belgrade/Institute for Chemistry, Technology and Metallurgy, Njegoševa 12, 11000 Belgrade, Serbia

[2]Otto-von-Guericke University and Max-Planck Institute for Dynamics of Complex Technical Systems, Magdeburg, Germany

[3] University of Belgrade/Faculty of Technology and Metallurgy, Department of Chemical Engineering, Karnegijeva 4, 11120 Belgrade, Serbia

Abstract

The nonlinear frequency response (NFR) method is applied for evaluation of possible improvement through simultaneous periodic modulation of two inputs of a non-isothermal continuously stirred tank reactor (CSTR) in which homogeneous *n*-th order reaction *A→product(s)* takes place. The two modulated inputs are the concentration of the reactant in the feed steam and the temperature of the feed stream. The cross asymmetrical second order FRF which correlates the outlet concentration with both modulated inputs is derived and analyzed. The optimal phase difference which should be used in order to maximize the conversion is determined. The method is tested on three numerical examples of non-isothermal CSTRs: a) one which is oscillatory stable with strong resonant behavior, b) one which is oscillatory stable with weak resonant behavior and c) one which is nonoscillatory