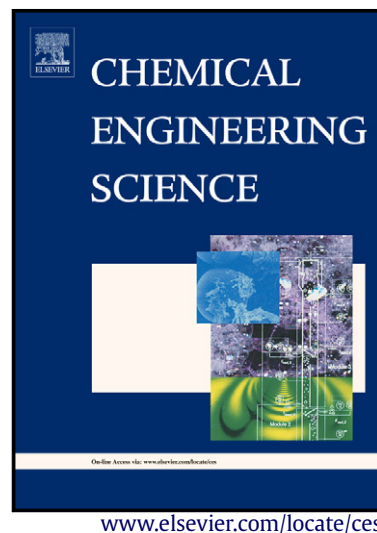


Nonlinear frequency response analysis of forced periodic operation of non-isothermal CSTR with simultaneous modulation of inlet concentration and inlet temperature

Daliborka Nikolić, Andreas Seidel-Morgenstern, Menka Petkovska



PII: S0009-2509(15)00426-1
DOI: <http://dx.doi.org/10.1016/j.ces.2015.06.018>
Reference: CES12421

To appear in: *Chemical Engineering Science*

Received date: 30 December 2014

Revised date: 21 April 2015

Accepted date: 2 June 2015

Cite this article as: Daliborka Nikolić, Andreas Seidel-Morgenstern, Menka Petkovska, Nonlinear frequency response analysis of forced periodic operation of non-isothermal CSTR with simultaneous modulation of inlet concentration and inlet temperature, *Chemical Engineering Science*, <http://dx.doi.org/10.1016/j.ces.2015.06.018>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

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

Daliborka Nikolić¹, Andreas Seidel-Morgenstern², 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 $A \rightarrow \text{product}(s)$ takes place. The two modulated inputs are the concentration of the reactant in the feed stream 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

Download English Version:

<https://daneshyari.com/en/article/6589398>

Download Persian Version:

<https://daneshyari.com/article/6589398>

[Daneshyari.com](https://daneshyari.com)