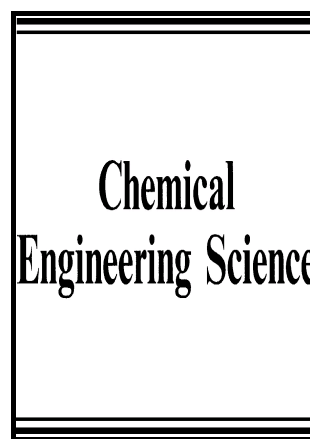


Author's Accepted Manuscript

Coupled autocatalytic reactions: Interconversion and extinction of species

Aditi Khot, S. Pushpavanam



www.elsevier.com/locate/ces

PII: S0009-2509(16)30585-1
DOI: <http://dx.doi.org/10.1016/j.ces.2016.11.010>
Reference: CES13232

To appear in: *Chemical Engineering Science*

Received date: 8 August 2016
Revised date: 27 September 2016
Accepted date: 2 November 2016

Cite this article as: Aditi Khot and S. Pushpavanam, Coupled autocatalytic reactions: Interconversion and extinction of species, *Chemical Engineering Science*, <http://dx.doi.org/10.1016/j.ces.2016.11.010>

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

Coupled autocatalytic reactions: Interconversion and extinction of species

Aditi Khot^a, S.Pushpavanam^{a,1,*}

^a*Department of Chemical Engineering, Indian Institute of Technology Madras, Chennai, 600 036, INDIA*

Abstract

An autocatalytic reaction involves a species catalyzing its own formation and can be viewed as a mechanism to explain self-replication. This class of chemical reactions can be used to model phenomena across a wide cross-section of disciplines, i.e. chemical reaction engineering, biology, ecology, social sciences and economics. Here, we study a system of two species undergoing autocatalysis. Each species participates in the autocatalysis of the other. The autocatalytic reactions can represent interconversion of two social groups or isomers into each other. The two autocatalytic steps are assumed to be elementary and follow cubic and quadratic laws. We examine the behavior of this coupled autocatalytic system at steady state. Specifically, singularity theory and bifurcation theory are applied to classify the bifurcation behavior of the system. The focus of the work is to obtain the conditions for extinction or complete conversion of one of the species. We analyze the system for all combinations of generation and decay reactions. We find the common features and dominant factors in the different combinations analyzed.

Keywords: Autocatalytic reactions, Bifurcation Theory, Singularity Theory, Species interconversion, Extinction

*Corresponding author

Email address: spush@iitm.ac.in (S.Pushpavanam)

¹Tel.: +91-44-2257 4161

متن کامل مقاله

دریافت فوری ←

ISIArticles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات