ABSTRACTS OF PAPERS PRESENTED AT INTERNATIONAL CONFERENCES

The abstracts of papers published in this magazine pertain to research projects conducted all over I.R. Iran, including those which have been printed previously in reputable scientific publications, not specifically limited to the Sharif University of Technology. The Editor would be pleased to include in future editions abstracts of all scientific papers presented by researchers throughout the country, with a view to keeping the academia and professionals informed about research activities carried out by Iranian scientists.

COMPENSATION OF SOURCE INDUCED INTENSITY NOISE IN OPTICAL NETWORKS*

F. Behnia
M. Tabiani
Dept. of Electrical Engineering
Sharif University of Technology

ABSTRACT

In this paper, a method of compensating for the source induced intensity noise in links and WDM networks employing non coherent sources is proposed. Numerical analysis shows that using this method, probability of error reduces substantially, permitting higher signaling rates and/or more simultaneous network users with a given error threshold.

ACCURACY OF THE RICCATI TRANSFER MATRIX METHOD IN ROTOR DYNAMIC ANALYSIS**

M. Behzad
Dept. of Mechanical Engineering
Sharif University of Technology
B. Mehri
Dept. of Mathematics
Sharif University of Technology

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ABSTRACT

This paper illustrates the theory behind the development of a general form of a numerically accurate and stable software for determining the lateral natural frequencies, mode shapes, stability and unbalance response of multi-shaft rotor bearing systems which may be gear coupled and supported on flexible anisotropic bearings, such as hydrodynamic bearings as well as rigid rolling elements. Gyroscopic effects, shear deformation and hysteretic damping are included in the analysis. To achieve the improved accuracy and numerical convergence to all relevant roots of the characteristic equations, the Riccati transfer matrix is utilized rather than the traditional transfer matrix approach. This more accurate approach introduces poles into the characteristic equation. After cancellation of all poles, convergence to all relevant roots is guaranteed. In this study, two different methods of handling in-span conditions are presented and it is proven that, after elimination of poles the Riccati transfer matrix method and transfer matrix method have the same characteristic equation. However, with even 25% increase in average computation time the Riccati transfer matrix method remains more accurate due to a different method of calculating the characteristic equation.

STUDIES ON DEGRADATION OF PETP IN MECHANICAL RECYCLING*

M. Forounchi
Dept. of Chemical Engineering
Sharif University of Technology

ABSTRACT

Effect of reprocessing on poly ethylene terephtha- late, PETP, was studied. While mechanical properties showed a slight decrease, weight-average molecular weight M_w dropped more notably. Blends of 20 w/w % recycled PETP with virgin PETP showed practically the same mechanical properties and M_w as virgin PETP properties. The results suggest that mechanical blending can be used for recycling purposes without sacrificing useful properties of the virgin PETP.

THE KINETICS OF PH-INACTIVATION OF PENICILLIN GACYLASE OBTAINED FROM VARIOUS SPECIES OF ESCHERICHIA COLI STRAINS**

A. Kheirolomoom
M. Kazemeini
Dept. of Chemical Engineering
M. Vossoughi
Biochemical and Bioenvironmental Research Centre
Sharif University of Technology
M. Ardjmand
Dept. of Chemical Engineering
Islamic Azad University
V. Kasche
Arbeitsbereich Biotechnologie Technische Universitat Hamburg-Harburg, Hamburg, Germany.

ABSTRACT

A modified model was proposed for the pH-inactivation rate constant of penicillin G acylase obtained from various species of Escherichia coli. A new approach was applied and a new parameter called steric factor was defined to obtain the more precise description of the pH-inactivation rate constant. The parameter is used as the measure of the conformational rigidity of the enzyme with respect to pH. The proposed model accuracy was verified and compared with the reported models. The analysis of the experimental data indicates that the assumption of the so-called steric factor and the model is consistent with the theoretical principles of the pH-inactivation

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reaction. The model can be used for pH-inactivation studies of other biocatalysts by determining its parameters.

EXPERIMENTAL OPTIMIZATION OF PARAMETER AFFECTING ETHYLENE-ETHANE SELECTIVITY IN FISCHER-TROPSCH SYNTHESIS*

S. Pakseresht
M.M. Akbarnejad
Research Institute of Petroleum Industry
M. Kazemeini
Dept. of Chemical Engineering
Sharif University of Technology

ABSTRACT

This research was fulfilled in order to optimize operating condition and define a suitable catalyst for ethylene-ethane (C_2) production, via Fischer-Tropsch synthesis. The influence of different variables such as types of supports (i.e.; zeolites: Y, 5A, ZSM5) and transition metals (Mn-Fe, Fe-Cu) on the activity and ethylene-ethane selectivity was evaluated. Five catalysts were tested in a fixed bed reactor, by using a synthesis gas with CO/H_2 = 1/3 and 1 mole feed ratio at temperature ranging from 220-300 °C and under pressure varying from 11 to 18 bar. It was observed that catalyst Fe-Cu/ZSM5 at 18 bar and 300 °C with CO/H_2 = 1 gives the best result for C_2 production.

CATALYTIC CONVERTER PERFORMANCE IN DUAL FUEL (NATURAL GAS/DIESEL) ENGINES**

N. Sallamie
M. Kazemeini
M. Soltanieh
Dept. of Chemical Engineering,
Sharif University of Technology
M. D. Checkel
Dept. of Mechanical Engineering
University of Alberta, Alberta, Canada.
A. Badakshan
Dept. of Chemical and Petroleum Engineering
University of Calgary, Alberta, Canada.
M. Zheng
E.A. Mirosh
Alternative Fuel Systems Inc. Alberta, Canada.

ABSTRACT

The diesel-engined vehicle is a critical part of transportation systems supporting modern industrial societies. Desired economical and technical aspects, reliability, simplicity, long term durability and derivability are some of the advantages of these engines. They are also a major consumer of petroleum fuels and a major contributor to urban air pollution. The search for alternative fuels has been encouraged by both the limited supply of petroleum and the severe local pollution problems in some countries. The ideal replacement for diesel fuel would be the one still retaining the advantages of such engines which include relatively high efficiency, low fuel cost and long term durability. The dual fuel approach reduces diesel consumption by replacing most of the injected diesel with natural gas (up to 90%) which is premixed with the intake air. Lower C/H ratio of natural gas, combined with the cycle efficiency, allows about 15% lower carbon dioxide emissions and, thereby, less greenhouse gas. On the other hand, cleaner combustion of the dual fuel system results in less lube oil contamination, thus, longer overhaul intervals.

A small amount of diesel fuel is injected to ignite the natural gas which resists autoignition even at diesel compression ratios. Natural gas is one of the most abundant, economic and widely distributed alternative fuels, so it has the potential of significantly reducing diesel consumption. Dual fuel engines using a smart controller can optimize the ratio of the natural gas and diesel fuels to simultaneously provide normal engine output, low fuel consumption and low emissions. In

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spite of the attractive features of this idea, including reduction of NO_x and particulates, high concentration of CO and unburned hydrocarbons (HC), mostly composed of methane, there is an important burden imposed upon the system at low to intermediate torques. In this work, based upon the oxidation of CO and unburned HC's, through experimental results, application of a monolithic oxidizing bifunctional catalytic converter as a novel complementary for the dual fuel (natural gas / diesel) engine is introduced. A new method called switching, is used to keep temperatures high across the converter and retain advantages of the corresponding desired conversion for hydrocarbons.

A NEW MODIFICATION FOR THE PENG-ROBINSON EQUATION OF STATE*

S. Ghotbi
Dept. of Chemical Engineering
Sharif University of Technology
F. Feyzi
University of Science and Technology
M-R. Riazi
Kuwait University

ABSTRACT

New generalized temperature dependent parameters are proposed for the Peng-Robinson equation of state which have significantly improved liquid density and vapor pressure of all the families of hydrocarbons, especially heavy compounds.

The new modification requires the same input parameters as the original Peng-Robinson equation of state. It is a simple generalized method which estimates the properties of pure compounds and mixtures of light and heavy compounds found in reservoir fluids.

In this article, based on the data of vapor pressure and saturated vapor and liquid densities of a number of hydrocarbons, generalized parameters for the Peng-Robinson equation of state are found which require no additional input parameters. This new modification has overcome the weakness of the original equation in predicting the vapor pressure and volume of heavy hydrocarbons. This is an advantage over the other modifications of PR EOS.

The accuracy of this modification in predicting both the vapor and liquid densities is high and of the same order of magnitude, which means that a single equation can be used in vapor pressure and liquid and vapor density calculations at the same time without any change. This is an advantage over many other modifications of equations of state.

The generalized parameters are very accurate in predicting the properties of fluids which have not been used in their derivation.

FLOW BOILING HEAT TRANSFER IN HORIZONTAL TUBES**

A. Nouri-Borujerdi
Dept. of Mechanical Engineering
Sharif University of Technology

ABSTRACT

Non-equilibrium boiling of a stratified co-current two-phase flow has been studied in a horizontal tube. Heat transfer from the upper part of the tube perimeter to the adjacent vapor causes the vapor to be superheated. Some part of the vapor energy is transferred to the liquid across interface between two phases. In this case the boiling rate is lower than that in an equilibrium process. The temperature distribution along the tube perimeter nearly looks like an exponential function. Due to this temperature distribution, some part of the heat supplied at the middle part of the tube next to the liquid-vapor interface is conducted to the top and the bottom sections.

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