ABSTRACTS OF PAPERS PRESENTED AT INTERNATIONAL CONFERENCES

VIBRATION PROBLEM OF AN ELASTICALLY- RESTRAINED CIRCULAR PLATE WITH A CONCENTRATED MASS AT THE CENTER

Abstract

Free transverse vibration of a free circular plate restrained elastically on its boundary by torsional springs and carrying a concentrated mass at the plate center has been studied (Fig.1).

The modal expansion technique has been used to formulate the plate deflection function and the so called receptance method, a similar but more efficient method than the finite element method and more often applied to regularly-shaped geometries, has been used to determine the frequency equation. In this process, the slope of the plate is matched with the slope of the torsional springs around the plate edge from one side and the deflection of the plate is matched with the deflection of the concentrated mass at the center from the other side.

Results for natural frequencies of the plate system for a number of torsional spring constants and various mass ratios are presented.

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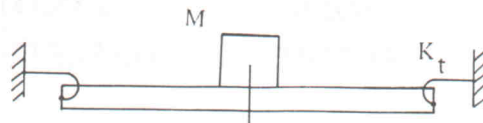
(Fig.1) An elastically restrained circular plate carrying a concentrated mass at its center.

ازدکتر سعید عظیمی (دانشکده مهندسی مکانیک ـ دانشگاه صنعتی شریف)
در First U.S.National congress on computational Mechanics
(ژوئیه ۱۹۹۱ ـ امریکا)

STRENGTHENING CONNECTIONS OF CONCRETE FRAMES IN HIGH SEISMICITY ZONES

Abstract

The integrity of concrete frames is usually maintained by the connections. Connections transfer lateral loads due to earthquake to other components of the structure. In practice the main steel reinforcements are extended from the lower columns into the upper columns, and from one beam to the next, to provide monolithic action. Also, a fraction of the steel reinforcements from the beams are extended into the columns. To assure that the flexural capacity of the members can be developed especially under earthquake loadings, and for the concrete to withstand the inelastic response of the structure, it is essential to provide confinement at connections. The internal confinement of connections is achieved by placing closed ties, spirals, or stirrups around the main steel reinforcements passing through the joints.

Recent case histories have shown that providing the aforesaid details at the connections in regions with high seismicity may not be sufficient to prevent connection failures caused by inadequacies in strength and/ or ductility. In the past two decades, investigation have been conducted to define a minimum confining steel for connections to increase strength and ductility. However, the code requirements and the new research findings can be implemented in new concrete structures. For existing concrete frames which need to be retrofitted effective methods should be introduced to strengthen the connections.

Based on the aforementioned arguments, the objective of this paper is to introduce an effective retrofitting method to improve both the strength and ductility of the connections of concrete frames. In this method, using steel rods and steel (or any other suitable material) plates, the connections will be compressed, using post- tensioning technique. In other words, this method will provide external confinement at the connections. External confinement of the connection causes the state of multiaxial compression (this includes the compressive stresses developed from the column load at the joint) in concrete. It is worth mentioning that at the edges of the joints large magnitudes of shearing stresses especially from the columns will be developed during an earthquake. Hence, in addition to the joints, a portion of the columns and beams near the joints will also be confined by post- tensioning.

Past research findings and those recently obtained by the author clearly reveal that concrete under the state of multiaxial compression with and without shearing stresses shows a tremendous increase in both strength and ductility, as compared to unconfined uniaxial compressive behavior.

A connection of a concrete frame in this study is defined as the thickness of the joint plus one half to two times the thickness of the joint from each end.

With the experimental and theoretical supports of the concrete behavior under multiaxial loadings, the idea for implementing this effective method of externally confining concrete connections for the improvement of the strength and ductility to resist earthquake loads will be fully explained. Lastly, to back up the idea will be presented.

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TRANSIENT DISPERSION IN LAMINAR TUBE FLOW

Abstract

Transient dispersion of a solute slug in laminar tube flow is described by a very simple analytical solution. The model, which is based on the exact series solution of Gill and Subramanian, contains a time- dependent dispersion coefficient $K_2 (\pi)$ that depeneds on a single parameter, T, in a simple form according to $K_2 (\pi) = \frac{1}{192} [1 - \exp(-t/T)]$.

The parameter T, which is called the decay time, is the time required for the mean concentration to approach $1/e$ of its initial value. It is calculated from the Taylor's dispersion model and depends only on the tube radius and the molecular diffusion coefficient of the solute, and therefore it is a characteristic parameter of the flow.

When this model for time- dependent dispersion coefficient is used in the convective diffusion equation, a simple analytical solution is obtained for the area mean concentration as a function of time and axial distance. It is shown that this simple analytical solution, in the form of an error function, compares well with the more complicated series solutions, including the work of Gill and Subramanian, perturbation solutions, numerical solutions, as well as some experimental data from the literature. At large times or distances from the source of injection, the model's prediction approaches asymptotically to those from Taylor's original work. The model is particularly useful when the tube length or

the dimensionless time have intermediate values.

The present model does not predict the double peak behavior of the elution curves which may appear under certain conditions. These conditions include: very large peclet numbers (say Pe > 5000), very small dimensionless times (say $\pi < 0.02$), or a combination of both. However, in most practical situations the predicted transient behavior from zero time to the times that the Taylor model applies, is sufficiently accurate.

The model is useful in predicting the concentration distribution in short tubes and packed beds including the chromatographic columns.

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ازدکتر محمدسلطانیه (دانشکده مهندسی شیمی ـ دانشگاه صنعتی شریف) در
Fourth World Congress of Chemical Engineering
(ژوئن ۱۹۹۱ ـ آلمان)

STUDIES ON L-GLUTAMIC ACID FERMENTATION USING IRANIAN BEET MOLASSES.

Abstract

Glutamic acid accumulation in fermentation medium containing Iranian beet Molasses by Corynebacterium glutamicum ATCC (13032) was investigated.

The maximum concentration of glutamic acid present in fermentation medium containing 180 g/1 beet molasses was 78 g/1, this corresponds to a conversion of about 83% of sugar present in the medium. The effect of biotin, surfactant and oxygen transfer coefficient was studied, and a 42% increase in the production of L- glutamic acid was obtained by using 0.65 gl^{-1} of Tween 60. The most effective addition time of Tween 60 was at the logarithmic phase.

In order to investigate the influence of oxygen supply on the formation of glutamate, we have changed the oxygen transfer coefficient ($k_L.a$) by variation of suitable agitation and aeration. The effect of air flow rate per unit volume of liquid ($F/_V$) and revolution number (N) on oxygen transfer coefficient in sulfite solution are expressed by the empirical formula: $K_L.a = m \left(\frac{F}{V} \right)^b .N^c$ where m,b and c are constants of characteristics of the fermenter.

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ازدکترمنوچهروثوقی(دانشکده مهندسی شیمی ـ دانشگاه صنعتی شریف) در
Fourth World Congress of Chemical Engineering
(ژوئن ۱۹۹۱ ـ آلمان)

OPTIMIZING MOTION TRAJECTORIES IN DEXTROUS FINGERS BY DYNAMIC PROGRAMMING TECHNIQUE

Abstract

An optimization technique based on the well- known Dynamic Programming Algorithm is applied to the motion control trajectories and path planning of multi- jointed fingers in dextrous hand designs. A three fingered hand with each finger containing four degrees of freedom is considered for analysis. After generating the kinematics and dynamics equations of such a hand, optimum values of the joints' torques and velocities are computed such that the finger- tips of the hand are moved through their prescribed trajectories with the least time or/ and energy to reach the object being grasped.

Finally, optimal as well as feasible soulutions for the multi- jointed fingers are identified and the results are presented.

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ازدکتر علی مقداری (دانشکده مهندسی مکانیک ـ دانشگاه صنعتی شریف) در
1991 ASME International Computer in Engineering Conference and Exposition
(ژوئیه و اوت ۱۹۹۱ ـ امریکا)

EFFICIENT METHOD OF USING HIGH-DENSITY DIGITAL RADIO IN PRE- ESTABLISHED ANALOG NETWORK

Abstract

We have analyzed the major technical parameters of digital and analog radio systems such as transmission performance, modulation, bandwidth, interference and fading. We have shown that the last two parameters are more importnt, therefore we have modeled them and compared the results with suitable probability distributions which can be assumed.

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از دکتر محمود تبیانی (دانشکده مهندسی برق ـ دانشگاه صنعتی شریف) و مهندس منوچهری (شرکت مخابرات ایران) در
International Conference on Signal, Data and System AMSE
(نوامبر ۱۹۹۱ ـ تونس)

ENGINEERING DESIGN MANAGEMENT VECTOR MODEL

Abstract

It is postulated that, just as does vector analysis, engineering design process should aim at achieving certain goals. As engineering design environment may be thought of as a spatial medium with a defined activity boundary, in a specific time and location, if appropriate tools (human beings and other resources) could be recognised and provided, it may be considered to follow a pattern of 3D- frustum (or 3D-vector). Management inte grated engineering design (as part of simultaneous engineering) of a specific problem, should also be envisaged as an entangled (with certain supremacy, as the final "Yes" or "No" is with the management) activity in a truncated conic environment, due to its interdependence on the succes of engineering projects.

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از دکتر علی امیر فضلی (دانشکده مهندسی مکانیک ـ دانشگاه صنعتی شریف) در
International Expert Group: Management of Engineering Design Project: History State- of- the Art, Future Development.
(اوت ۱۹۹۱ ـ سویس)

THE KINETICS OF LACTOSE HYDROLYSIS IN WHEY USING B- GALACTOSIDASE

Abstract

B- galactosidase (Lactase, EC. 3. 2. 1. 23) activity was determined by using free and immobilized enzymes entrapped in poly vinyl pyrrolidone gel. The effect of membrane thickness on the rate of reaction shows the presence of some internal diffusion effect, so an optimal thickness is necessary for enzymatic hydrolysis of lactose in whey.

By studying the enzymatic hydrolysis of whey and the effect of product inhibition, a kinetic model following the Michaelis- Menten type including a competitive product inhibition was assumed.

Comparing the storage stability of free and immobilized lactase in gel at 50 °c, a significant stability of immobilized preparation in this study was identified.

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ازدکتر ایران عالمزاده ودکتر منوچهر وثوقی (مرکز بیوشیمی ـ دانشگاه صنعتی شریف) در
Fourth World Congress of Chemical Engineering
(ژوئن ۱۹۹۱ ـ آلمان)

EXPERIMENTAL INVESTIGATION ON HEAT RECOVERY FROM SPOUTED BED BURNERS

Abstract

The previous experiments on spouted bed combustors encourages the possibility of spouted bed being examined experimentally for use as an industrial furnace a copper coil cooled by internal flowing water is placed inside the dense phase of a reacting spouted bed. The stability regions for several bed heights with and without coil are obtained. At steady combustion conditions the temperature difference of inlet and outlet water is measured to give the rate of heat recovery from the combustor. The rate of heat release and heat losses are also worked out in several operational conditions. This investigation resulted in the promising performance of spouted bed combustors.

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از دکتر محمد خشنودی (دانشکده مهندسی شیمی ـ دانشگاه سیستان و بلوچستان) در بیست و چهارمین سمپوزیوم جهانی احتراق (سیدنی ـ استرالیا)