ABSTRACTS OF PAPERS IN ENGLISH

A COROTATIONAL CONSTITUTIVE MODEL FOR LARGE PLASTIC DEFORMATION ANALYSIS OF HARDENING MATERIALS

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ABSTRACT

In this paper, a corotational constitutive model for large plastic deformation of isotropic and kinematic hardening materials is introdeced. This model relates the back stress tensor with the logarithmic strain tensor, providing not only a non-oscillatory solution using jamann rate, but also the same results using Jaumann or Zaremba corotational rates. In other words, the response of this model is independent of the choice of corotational rate.

EFFECT OF SURFACE PROXIMITY ON THE AERODYNAMIC PROPERTIES OF A SURFACE EFFECT CRAFT´S AIRFOIL EFFECT CRAFT

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ABSTRACT

In this paper, the variation of aerodynamic properties of an airfoil in ground or free surface proximity is investigated. The linear vortex panel method is extended to include the effect of the proximity of an airfoil to an arbitrary surface. Two methods are introduced for ground or free surface modeling and their limit of application are compared. Some simple experiments are also performed for experimental validation of the theoretical results.

According to the results, effect of free surface deformation due to the motion of an airfoil in its proximity is negligible. Then one could consider the free surface as a solid one.

The best section form for attaining favorable characteristicts near the surface is an airfoil with small camber and thickness, which is placed at small angle of attack.

Wave surface form, i.e., wavelength and amplitude, could have a considerable effect on the aerodynamic properties. In summary, proximity of an airfoil to a wavy surface amplifies the surface effect.

DETERMINATION OF TEMPERATURE OF MOVING SURFACE BY SENSITIVITY ANALYSIS

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ABSTRACT

In this paper sensitivity analysis in inverse problem solutions is employed to estimate the temperature of a moving surface. Moving finite element method is used for spatial discretization. Time derivatives are approximated using Crank-Nicklson method. The accuracy of the solution is assessed by simulation method. The convergence domain is investigated for the determination of the temperature of a solid fuel.

FORMING MAGNETIC FIELDS IN A TWO DIMENSIONAL SPACE

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ABSTRACT

In this paper subject of controlled motion of a charged object with finite mass in a magnetic field has been investigated. By changing different parameters of the elements of the magnetic field, optimal trajectories have been calculated. Once the contour of trajectories are known, one can simply use them as a tool to select magnetic field parameters.

The current study has been confined to a magnetic field resulting from coils surronding a rectangular surface. In addition, an arbitary constraint might exist within the rectangle to be observed by the moving object. Besides the rectagular shapes, the methodology could well be extended to other shapes of magnetic fields.

AN INVESTIGATION OF THE AERODYNAMIC CHARACTERISTICS OF SUPERSONIC WRAPAROUND FIN MISSILES USING NUMERICAL SIMULATION AND WIND TUNNEL EXPERIMENTS

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ABSTRACT

An extensive experimental investigation has been conducted to study the aerodynamic characteristics of wraparound fin missiles. In the first step, the model of a standard wraparound fin missile has been tested in the Imam Hossein trisonic wind tunnel. The tunnel has a test section of 60 by 60 by 140 cm. The experiments were conducted in the range of mach numbers from 0.4 to 2.2 and at angles of attack between -4 to 10 degrees.

The results obtained in these experiments included the longitudinal coefficients, which have been compared with those obtained of NASA wind tunnel as well as an engineering code. Comparisons show good agreement with other experimental and engineering results. Further more numerical code is being developed to solve the flowfield around the same configuration. This code will be ready to use in the near future.

FAULT DIAGNOSIS IN ROTATING MACHINERY BY VIBRATION ANALYSIS

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ABSTRACT

Dynamic behavior of unbalanced bent shaft has been investigated in this research. Finite Element Method is used for unbalance response calculation of a bent shaft. The result shows the effect of bent on the unbalance response. The angle between bent vector and unbalance force, position and type of supports, shaft diameter and disk position can affect the outcome. The results of this research can significantly help in fault diagnosis in rotating Machinery.

VIBRATION ANALYSIS OF LAMINATED COMPOSITE PLATES USING SUPER ELEMENTS

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ABSTRACT

For analysis of structures, the finite element method has been widely used among the avalable approximation methods. However, in the conventional finite element method, many elements are required for obtaining accurate results, hence, the amount of time and relation costs are usually considerable. An advanced technique, which has recently been widely implemented, is the application of super element in the preliminary design of structures.

In this paper, a sizeable composite plate can be considered as one single super element, reducing analysis and assembling time drastically. Results of this study indicate that there is a good agreement between single super element and other methods.

APPLICATION OF MESHLESS GALERKIN METHOD IN FORMULATING FRACTURE MECHANIC PROBLEMS

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ABSTRACT

The meshless Galerkin method is a numerical method similar to finite element which depends on variational form of field governing system of equations. In Element Free Galerkin Method (EFGM), there is no need to discretize the domain into finite elements and working with number of points known as nodes is sufficiant. It can be said that this method has come into the trial in less than a decade, having main applications in the problems dealing with singularity. This is the case in most problems in the fracture mechanic field and more specifically in the crack tip analysis.

In this article, primarily some of the efforts regurding the introduction of this method during the last six years has been reviewed and then the detailed steps of formulation scheme, its accuracy, points of strength and weakness, and moreover, some of its applications are discussed.

MEASUREMENTS OF DIFFUSE REFLECTIONS FROM DIFFERENT SURFACES

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ABSTRACT

In this paper, the regular and diffuse reflections

from different surfaces are described. A general theory describing such reflections is developed and presented. The experimental arrangement for pursuing such measurements is reported. Design and construction of a beam - expanding telescope required in experimental setup is also presented in this study.

OPERATIONAL COMPARISON OF STATIC HEAD AND PUMP FEED OF WASTE WATER INTO THE UASB SYSTEM

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ABSTRACT

In this paper, the quantity of up flow velocity and calculating the maximum flowrate in UASB reactor is first explained. Then the effect of velocity on distributing tubes is described. More over, the defects and the advantages of each method is discussed. In the bottom feeding method it is necessary to have an appropriate equilibrium between kinetic energy, momentum force, friction loss on length of pipe and pressure loss during fluid passing from external holes. Therefore, in order to cover the mentioned conditions, experimental relationships have been used considering a reactor with the up flow velocity of 1m/hr and 6*8 m^2 section, for which the number of holes, diameter and their jet direction as compared with horizon have been obtained. In the top feeding method, for a cylenderial reactor with $72m^2$ section and up flow velocity of 1m/hr, diameter and feeding tubes loss and number of weirs is calculated hence the heigh of the compartment after the weir is determined. Finaly, these two methods have been compared with practical experiences and it is concluded that if we prevent rubbish from entering, the bottom feeding pumping method is an easier operation.

INVESTIGATION OF THEORITICAL AND EXPERIMENTAL FLOW PATTERN OF DILUTE SLUDEGE IN CONVERGENT DIVERGENT CONDUIT

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ABSTRACT

In this work, the sludge flow in a UASB reactor has been investigated. This research has been conducted considering both practical and theoretical methods. For experiments, a pilot plant was built. In the theoritical method, the governing equations of fluid flow were solved. The mas and momentum 2-D equations were solved for the laminar? Up flow vertical channel. Results demonstrate that a vortex forms after each gas collector. The collector geometry and input velocity can affect the vortex shape and its power. The experimental results were illustrated by photographs, which revealed that stability of vortex depends on the shape of the collector. The streamlines of flow can be generated by dye injection in the reactor.