COMPRESSIBILITY AND REDUCED FREQUENCY ON THE UNSTEADY AERODYNAMIC BEHAVIOR OF A FIGHTER MODEL

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Abstract
A model of a fighter aircraft known as the Standard Dynamics Model, SDM, has been tested to investigate its aerodynamic behavior during oscillatory maneuvers. The experiments were conducted in the trisonic wind tunnel of Imam Hossein University, Tehran, at Mach numbers of 0.4, 0.6 and 1.5, corresponding to the Reynolds numbers of 0.84, 1.26 and 3.15 ν 107 per meters, respectively. The oscillation frequencies were 1.25, 2.77 and 6.00 Hz with the mean angles of attack ranging from 0 to 14 degrees. The static and dynamic force and moment, as well as the dynamic derivatives, were measured. Further, the unsteady aerodynamic behavior of the SDM in both pitching and plunging motions has been studied. A comparison has also been made between the dynamic derivatives measured in the present experiments and those obtained in several research centers all over the world on the same model. The data compares well within the angles of attack tested in this tunnel, which indicates the accuracy of the experimental setup, data acquisition and reduction, as well as all data corrections made in the present experiments.

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GEOMETRICAL OPTIMIZATION OF TLP USING GENETIC ALGORITHM METHOD BASED ON MINIMIZING DOWN TIME UNDER REGULAR SEA WAVES

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Abstract
This paper deals with the optimization of the geometrical parameters of the Tension Leg Platform (TLP) in regard to minimizing the down time period. Here, the most effective parameter is vertical acceleration. The regular wave loads on the elements of the pontoon are calculated using the Airy wave theory and Morrison's equation, ignoring the diffraction and radiation effects. The nonlinear equation of motion is solved in the time domain using the modified Euler method (MEM). Finally, by using the Genetic Algorithm (GA) method, the optimized geometrical configuration for the TLP is determined. Numerical results show the effectiveness of the obtained configuration of elements on minimizing down time.

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OPTIMAL SHAPE FOR THE UNSYMMETRIC BONDED COMPOSITE REPAIR PATCH

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Abstract
The bonded repair of cracked metallic plates of airplanes with composite materials has proved to be highly effective, due to high strength, low weight and easy application. Here a center cracked aluminum plate with an unsymmetric bonded composite repair patch is considered and searched for optimum patch shape, using the two dimensional finite element method. The three layer technique is used in the model and the stress intensity factor is obtained from the modified crack closure method. Many patches with constant volume and different shape, including rectangular, elliptical and polygonal shapes, are investigated. The results show that the polygonal shape results in the lowest stress intensity factors.

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Abstract
Using an existing control volume based computer code, swirling flow field and combustion of fuel and air are computed. In order to model turbulent stresses, a modified Bossinisque scheme in swirling flows is used. Turbulent flow is modeled using a RNG k-ε model and combustion is modeled by two well-known models, i.e., the bi-molecular Arrhenius relation and the EBU (Eddy Break Up) model. The results of the numerical solution of a combustion chamber are compared with the existing experimental data for velocity and temperature distributions. The comparison shows satisfactory agreement between numerical and experimental results. The lower reaction rate computed using the above models is used in the computation. In this study, variable fluid properties have been used and their effects are presented. It is shown that the existance of either swirl or combustion shortens the length of the recirculating region and the same effect is produced by using RNG k-ε instead of the standard turbulence model.

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DEVELOPMENT OF 2D VIBRATION MEASURING SYSTEM USING IMAGE PROCESSING METHOD; AN INVESTIGATION ON FORCED VIBRATION OF HUMAN BODY IN VERTICAL DIRECTION

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Abstract
Vibration measurement is an important tool in many research fields and there are several methods for measuring the vibration of a system. In conventional methods, accelerometers are fixed to the body, so there is a systemic error due to fixing an external object to the body surface that interferes with the true vibration of the body. Image processing has been proposed as a new method to record and determine the frequency response of the human body. This method provides vibration measuring without using contacting sensors. Moreover, the main advantage is in its lower noise sensitivity in comparison to the accelerometer. Furthermore, another important point is the fact that all devices used in this developed measurement system are usually available in a biomechanics laboratory where a Gait system is functioning. This gives the opportunity for such a laboratory to add vibration measurement to its capabilities without too much excessive cost.

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DESIGN AND FABRICATION OF "CEDRA" RESCUE ROBOT WITH ESPECIAL CAPABILITIES

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Abstract
This article presents an overview of the mechanical design features and characteristics of a Rescue Robotic unit for operation in unstructured environments. Upon fabrication, this unit has been tested in a clean laboratory environment, as well as in ill-conditioned arenas similar to earthquake zones. The obtained results have been satisfactory in all aspects and improvements are currently underway to enhance the capabilities of the rescue robotic unit for various applications.

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AN EXPERIMENTAL INVESTIGATION OF THE EFFECTS OF

ABSTRACTS OF PAPERS IN ENGLISH

EFFECTS OF WHEEL PROFILES ON STABILITY, RUNNING BEHAVIOR AND WEAR OF WHEELS IN MD36 BOGIE

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Abstract

In "Rail Vehicles", the "Bogie" is the main part that connects the car body to the rail. It transmits loads from the car body (locomotive, passenger or freight cars) to the rail and allows the motion of rail vehicles. Wheel profile has a significant effect on the running behavior of bogies. In this paper, the aim is to explain the effects of wheel profiles on the wear of wheel and rail. Three wheel profiles: "S1002", "SZD" and "a worn profile in the taper head of the wheel" (with rail profile UIC60 (1/40 inclination)) are considered. After profile analyzing, the behavior of an MD36 bogie is considered. Hunting in bogies is described and the effect of these profiles on the stability of the bogie is defined. A curved rail with a 200m radius and random irregularities is considered and the effect of these three profiles on the running behavior of the bogie, such as: derailment, ride comfort, forces in suspension elements and wheel wear are obtained. Finally, the results for these three profiles are compared and it is shown that the wheel profile has a very high influence on wheel wear. Also, it is shown that the wear in the taper head of the wheel profile is very important and measuring the flange thickness is not enough for checking the wheel profiles.

NUMERICAL SIMULATION OF FLOW FIELD WITH SWIRLING-COMBUSTION IN A COMBUSTION CHAMBER

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