ble and distribution of the loading is symmetric. Based on these information, a computer program is written which solves the equations numerically using triangular ring type finite elements. In this analysis, the effect of system motion and its induced forces over final responses of different nodes, the effect of damping over displacements of the nodes and also the effect of supports position over the natural frequencies and nodes displacements are studied.

COMPUTATIONAL NONLINEAR LEAST SGUARES IN ELECTRIC CURRENT TOMOGRAPHY*

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ABSTRACT

Producing images of cross sections of body or Tomography has applications in Medical Engineering. We consider the electric current Tomography which has recently attracted some attention. The quantity which plays a key role in representing the picture is the Conductivity (or Resistivity) of the existing tissues in the cross section of the body. Electrical current is injected into the body and the voltages of various points of the surrounding environment are measured. The injection of electrical current and the measurement of the voltages are accomplished by certain electrodes around the surface of the section. The distribution of body resistivity is estimated by using the measured voltages. Several

computational methods for constrtuction of the image (computing conductivity distributions) are discussed resulting in optimization models of the nonlinear least squares type. Various numerical techniques for solving the least squares problem are discussed. A system is built to demonstrate the practical usefulness of electric current Tomography. The system is tested and useful results are noted.

PREDICTION OF PHASE CURRENT AND TORQUE WAVE FORMS IN A PERMANENT MAGNET BRUSHLESS DC MOTOR BY TRANSFORMED STATE - SPACE APPROACH*

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ABSTRACT

In this paper a new model of machine and a simple statespace method for the analysis of a permanent magnet brushless DC Motor (BDCM), is used. This model is more useful and gives the high accuracy for the analysis resultants. Sample calculation for a 24 volt, 4 poles prototype motor is presented. Current and torque wave forms at three different. retarded, normal and advanced angles com are shown.

Ray diffraction (XRD) and scanning electron microscopy (SEM) techniques. The effect of varying substrate temperature, T_s, and O_2/Ar ratio on lattice parameters and on the degree of orientation of the films were examined. Both c- and a- lattice parameters decreased with increasing T_s. The reduction of c and a- lattice parameters as well as the oxygen deficiency in the films, δ obey general $(T_s - T_0)^{-4}$ behavior. We developed a new method to measure a more accurate way to find the degree of preferential orientation along c and a-axis of the deposited films($\frac{\Delta v_{006}}{\Delta v_{200}}$), at different T_s by using x-ray diffraction theory and JCPDS files to obtain, $\left| \frac{F_{(006)}}{F_{(200)}} \right|^2$. At T_s= 735 ^{0}C, the volume fraction along the c-axis was found to be $\Delta v_c \approx 5.5\ \Delta v_a$ corresponding to 85% of grains having preferred orientation along c-axis. In addition, we have also measured FWHM of the (oo6) and (2oo) peaks by varying T_s. The thickness of the grains was estimated at different substrate temperatures using the Scherrer formula.

ESTIMATING TRANSIENT PHASE CURRENT, TORQUE AND SPEED IN A BRUSHLESS DC MOTOR WITH BASIS TRANSFORMED STATE-SPACE TECHNIQUE*

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ABSTRACT

In this paper, a dynamic model for simulation of transient behavior of permanent magnet synchronous motor (PMSM) and brushless dc motor (BDCM), is presented. The formulation of this digital simulation, which employs a basis - transformed state - space technique, BTSS, is explained in detail. This transformation considerably simplifies the transient analysis for PMSM and BDCM.

Examples illustrating the accuracy of the method are given and comparisons are made with experimental data.

VIBRATIONAL ANALYSIS OF COMPOUND BODIES WITH ROTATIONAL SYMMETRY USING FINITE ELEMENT METHOD*

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ABSTRACT

The study of dynamic response of a rocket nozzle made of different materials, using the method of finite element, is the main task in this paper. In this investigation, based on known trajectory for the C.G of the rocket, the equation of motion of an arbitrary point in the nozzle is derived. Moreover, in derived equation of motion damping is incorporated and it is assumed that the body is symmetric, behaves elastically, the effect of thermal stresses are negligi-

IMIDAZOLE DYES: SYNTHESIS, STEREOCHEMISTRY AND APPLICATION*

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ABSTRACT

The benzimidazole nucleus is found in a variety of naturally occurring compounds such as vitamin B_{12} compounds and its derivatives and is also a key feature in cardiotonic agents such as pimobenden and adibenden, potential antitumor agents and antiulcer drugs. This group also possesses great thermal stability and has been used as part of the backbone in high performance, high temperature polymers. During the course of our studies directed toward the development of new dyes and biologically active molecules, we become interested in synthesis of substitued benzoylenebenimidazoles.

MICROWAVE PROMOTED KETALIZATION OF ALDEHYDES AND KETONES**

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ABSTRACT

A domestic microwave oven has been used to accelerate reaction of carbonyl compounds with ethylene glycol in the prescence of catalytic amount of Bronsted (PTS) or Lewis ($ALCL_3$, $FeCL_3$, $ZnCL_2$, $TiCL_4$) acids.

In comparison with traditional methods, high rates of reaction and yields of products, high safety as well as ease of work up, are the main advantages of this method.

COMPREHENSIVE X-RAY DIFFRACTION STUDY OF $Y Ba_2 Cu_3 O_{7-\delta}$ THIN FILMS*

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ABSTRACT

In situ annealed high temperature superconducting $YBa_2 Cu_3 O_{7-\delta}$ thin films have been deposited on an MgO (100) substrate from a single stoichiometric target using DC magnetron sputtering. The films were characterized by X-

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ABSTRACTS
OF PAPERS
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The abstracts of papers published in this magazine pertain to research projects conducted all over I.R. Iran, including those papers which have been printed previously in reputable scientific publications, and are not limited to the Sharif University of Technology. The Editor would be happy to include abstracts, in future editions 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.

AN EXACT PENALTY METHOD WITH REDUCED HESSIAN UPDATES FOR SOLVING CONSTRAINED OPTIMIZATION PROBLEMS*

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ABSTRACT

An algorithm using an exact penalty function and reduced Hessian updates for solving nonlinear optimization problems is described. A particular implementation of the algorithm and its testing with test problems from the literature is reported. The computational results show a superlinear rate of convergence and propose the algorithm as practical and competitive.