

Relations among the crack growth modes resulting from tensor splitting

VRATISLAV KAFKA

Abstract. The use of splitting stress tensors into deviatoric and isotropic parts is applied to modeling crack growth in cases of all three basic modes MI, MII, and MIII. The effect of the deviatoric part is modeled as local, the effect of the isotropic part as non-local. This way of modeling has been used and substantiated in a number of earlier author's papers for different materials, bodies and loading types.

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Experimental studies of electrical load schedules of residential electricity consumers in urban distributive power grids

ALEXANDR KOROTKOV, VLADIMIR FROLOV

Abstract. Selective experimental studies of electrical loads schedules of residential customers in urban distributive power grids were conducted. It was shown that residential consumers can be classified by the character of electricity consumption. Such classification allows dividing all the consumers into several groups with similar shapes of schedules loads. The calculated values of indicators of real schedules can improve the accuracy of determining the values of power losses. These values determine the choice of power grids and increase in their energy savings and efficiencies.

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Non-destructive testing of artificial hip and knee joints based on eddy current method

ANDREA ŠTUBENDEKOVÁ, MILAN SMETANA,
LADISLAV JANOUŠEK

Abstract. Non-destructive testing of conductive biomaterials by eddy current method is presented. The artificial joints are investigated in this study. The eddy current method is suitable for final inspection of prostheses before inserting an implant into human body. The main reason is to avoid repeated operations. An eddy current probe of absolute type is used for detection of defects with different depths using three frequencies. The numerical simulations are compared with experimental data in this article to select suitable frequency. The purpose is to determine which of the three frequencies provides the highest discrimination between magnitudes of eddy current signals gained for surface breaking cracks with different depths.

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MHD free convection radiative flow of visco-elastic fluid (Walter's liquid model-B) in the presence of chemical reaction

P. R. SHARMA, POOJA SHARMA, RUCHI SABOO

Abstract. A theoretical investigation is carried out to study the effects of chemical reaction and radiation on unsteady MHD free convection flow with heat and mass transfer through a visco-elastic fluid past an infinite vertical porous plate immersed in the porous medium with time-dependent oscillatory suction in the presence of heat source and uniform transverse magnetic field. The originality of the existing study is to discuss the consequences of time-dependent fluctuative suction and permeability of the medium on a visco-elastic fluids. The essentiality of the present investigation ascends as the most industrial fluids show the visco-elastic nature. The velocity, temperature and concentration distributions are derived, discussed numerically and depicted graphically for showing the effects of various parameters of the system. The result shows that the visco-elastic fluid velocity is decreased due the radiation and chemical reaction effects. As well as the coefficient of skin-friction, the Nusselt number and Sherwood number at the plate are obtained and reported in tabular form.

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Thermal effect on vibration of non-homogeneous parallelogram plate of parabolically varying thickness in both directions

ARUN KUMAR GUPTA, KUMUD RANA

Abstract. Free vibration of non-homogeneous parallelogram plate of bi-directional parabolically varying thickness with thermal effect is investigated. For non-homogeneity of the plate material, density is assumed to vary linearly. An approximate but quite convenient frequency equation is derived by the Rayleigh–Ritz technique with two-term deflection function. Using the method of separation of variables, the governing differential equation is solved. The frequencies corresponding to the first two modes of vibration are computed for a clamped parallelogram plate for different values of non-homogeneity constant, aspect ratio, thermal constant, thickness variation constant and skew angle.

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Transient MHD visco-elastic flow past an impulsively started infinite porous plate in presence of hall current

RITA CHOUDHURY, BANDITA DAS

Abstract. A theoretical analysis is performed to study the transient MHD flow of an electrically conducting visco-elastic incompressible fluid past an impulsively started infinite horizontal porous plate in a rotating system in presence of Hall current. The system rotates with constant angular velocity about the normal to the plate. A uniform magnetic field is applied along the normal to the plate directed into the fluid region due to small magnetic Reynolds number. The visco-elastic fluid is characterized by Rivlin–Ericksen second grade fluid model. The governing equations are solved by the regular perturbation technique. The analytical expressions for primary velocity, secondary velocity with temperature, concentration, shearing stress at the plate due to primary and secondary velocity fields have been obtained and illustrated graphically for the combination of various physical parameters involved in the solution.

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Convection along unsteady shrinking sheet with boundary slip and thermal jump in presence of radiation

UPENDRA MISHRA, GURMINDER SINGH

Abstract. Unsteady convective boundary layer flow of a viscous incompressible fluid over a permeable vertical shrinking sheet in the presence of thermal radiation is investigated. The flow model is studied with the first-order slip and thermal jump boundary condition. The governing equations of flow, i.e. continuity, momentum and energy, are transformed into a system of non-linear ordinary differential equations and then solved numerically. The effects of various physical parameters governing the flow, dependent on the velocity and temperature distributions, are discussed and presented by graphs. The variations in the skin-friction and Nusselt number with the change in physical parameters are discussed and presented in several tables.

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