MHD boundary layer stagnation-point flow and mass transfer over a permeable shrinking sheet with suction/blowing and chemical reaction

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Abstract. An analysis is made to study the mass transfer with chemical reaction in MHD boundary layer stagnation-point flow of an electrically conducting viscous incompressible fluid over a shrinking sheet with suction or blowing. The flow is permeated by an externally applied magnetic field normal to the plane of flow. The self-similar equations corresponding to the velocity and concentration fields are obtained by similarity transformations and are then solved numerically by the finite difference method using quasilinearization technique. The study reveals that the momentum and solute boundary layer thicknesses decrease with velocity ratio parameter and magnetic field strength. Furthermore, it is noted that due to larger shrinking velocity of the sheet and for variable concentration distribution along the sheet, the mass absorption occurs in some cases.

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MHD combined convective flow and heat transfer past a porous stretching surface embedded in a porous medium

Iswar Chandra Mondal, Swati Mukhopadhyay

Abstract. The boundary layer combining a convective MHD flow of an electrically conducting liquid due to a porous vertical stretching surface with a power-law stretching velocity in porous medium is presented. In the flow region, heat balance is maintained with thermal radiation. Using a special form of Lie group transformations viz. scaling group of transformations, similarity solutions for this problem are obtained. The transformed equations are then solved numerically. Velocity decreases but the temperature increases with the increasing values of permeability parameter. With increasing values of the radiation parameter, the velocity and temperature decrease. At a particular point of the porous stretching sheet, the velocity decreases with the increasing suction parameter. The dimensionless temperature at a point of the sheet decreases due to suction but increases due to injection. With the increase of magnetic field intensity, the fluid velocity decreases but the temperature increases. The findings of this study reveal that radiation and suction can be used as means of cooling the boundary layer flow region.

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Natural convection between rotating porous cylinders placed eccentrically

Sunita R. Jain, Satish C. Rajvanshi

Abstract. Investigation of the heat transfer between two eccentrically placed rotating cylinders is reported in the paper. The cylinder walls are porous which permit mass transfer across the walls. The clearance ratio between the two cylinders is taken to be small. Incompressible viscous fluid is contained in the eccentric region. The cylindrical surfaces are maintained at constant different temperatures. The energy equation has been transformed into a modified bipolar coordinate system. The temperature has been obtained as perturbation in terms of a measure of clearance ratio between the cylinders and the modified Reynolds number. The first order correction to the temperature in perturbation parameters has been calculated. The results are valid for small values of clearance ratio and modified Reynolds number; and for all values of eccentricity lying between 0 and 1.

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Comparison of geometrical parameters of rotary module for modular construction machinery

Jozef Svetlík, Peter Demeč,
Miroslav Janák, Jozef Dobránsky,
Renáta Turisová

Abstract. Optimization of curvature angle of rotating module is dealt with. The angle of curvature has a significant impact on the size of the workspace of modular kinematic structure constructed from such modules. The aim is to find the angle of curvature at which the maximum possible range is achieved and structure does not collide with itself. In case of comparison of geometric parameters of rotary module for modular construction machinery a mathematical model was used with utilization of Denavit–Hartenberg principle of coordinate systems deployment.

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Change of electromagnetic field distribution around high and medium frequency heaters due to presence of industrial robots

Jerzy Barglik, Alicja Kurek,
Roman Przyłucki, Albert Smalcerz, Maria Ślezok

Abstract. Analysis of the influence of the industrial robot located nearby an induction heater on distribution of its electromagnetic field is performed. First, investigations are carried out for a high frequency (330 kHz) heater and then for a medium frequency (10 kHz) heater. Altogether eight variants are considered differing in applied frequencies, presence (or absence) of the robot, and heater power. Then, an experimental verification is performed for the high-frequency induction heater. The aim of the paper is to evaluate the mutual interaction of both systems.

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On inductance and resistance of solitary long solid conductor

Oldřich Coufal

Abstract. Thomson's derivation of a formula for calculating the inductance of a cylindrical conductor supplied with sinusoidal current is analysed. The conclusion is that this inductance cannot be determined meaningfully. The same conclusion also holds for solitary long solid conductor of arbitrary cross-section.

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FPGA implementation of current *dq* to voltage *dq* converter

Mohammad Marufuzzaman,
Mamun B. I. Reaz, Mohd A. M. Ali

Abstract. A hardware implementation for finding stator direct and quadrature (*dq*) voltages from the stator currents is presented as a part of real-time hardware motion driver for a field oriented control (FOC) permanent magnet synchronous motor (PMSM), that was previously solved using software and firmware-dependent modules.

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