MHD convection heat and mass transfer at a stretching sheet in a saturated porosity medium

Mohammad Ferdows, Kuppalapalle Vajravelu

Abstract. MHD convection heat and mass transfer at a stretching sheet in a saturated porosity medium is investigated. We consider the viscous dissipation, Joule heating and double diffusive (Dufour and Soret) effects on the energy and mass boundaries. Also, the effects of suction/injection on the flow, heat, and mass transfer characteristics are considered. The nonlinear similarity equations governing the momentum, energy and mass transfer are solved numerically by the 6-th order Runge–Kutta method with shooting technique. The obtained numerical results are presented and the behavior of the solutions across the boundary layer is discussed through figures and a table.

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Nanofluid flow past an exponentially porous stretching sheet with heat and mass fluxes

Sudipta Ghosh, Swati Mukhopadhyay

Abstract. A mathematical model for steady boundary layer flow of nanofluid past an exponentially porous stretching sheet is presented. In this model, the combined effects of Brownian motion and thermophoresis on heat transfer and nanoparticle volume fraction in presence of variable heat and mass fluxes are considered. Similarity transformations are used and the self-similar equations are then solved numerically using shooting technique along with the fourth order Runge–Kutta method. This investigation reveals that the variable heat flux and mass flux have major effects on temperature field and nanoparticle volume fraction. The wall mass transfer through the porous sheet causes reduction of fluid velocity, temperature as well as nanoparticle volume fraction. For the Brownian motion, the temperature increases but the nanoparticle volume fraction decreases. The heat transfer rate becomes low with the increase of Lewis number. Due to increase in thermophoresis parameter, both the temperature and nanoparticle volume fraction increase.

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Onset of electrohydrodynamic instability of a rotating viscoelastic fluid layer saturating a porous medium

Gian Chand Rana, Ramesh Chand,
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Abstract. The effects of uniform rotation and AC electric field on the onset of instability of viscoelastic fluid heated from below saturating a porous medium for the case of free-free boundaries are studied. For the porous medium, Darcy model is employed and Walters' (model B') fluid model is used to describe rheological behaviour of viscoelastic fluid. In the stationary convection, it is observed that Walters' (model B') fluid acts like an ordinary Newtonian fluid. Rotation and Darcy number both have stabilizing influence whereas AC electric field has destabilizing influence on the stability of the system. However, Darcy number has destabilizing effect in the absence of rotation or if the rotation is negligibly small. The present results are in good agreement with the earlier published results.

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Measuring the amount of mechanical vibration during lathe processing

Štefánia Salokyová, Radoslav Kreheľ

Abstract. Possibility of vibration during frontal drilling as a consequence of changing depth of removed material is investigated and evaluated. Increase of mechanical vibrations dependent on the value of nominal thickness of splinter is observed during changing technological parameters of the drilling process as a consequence of rotation speed of the motor. The lathe processing can be characterized as removing material by precisely defined tools. The results of the experimental part are the values of the vibration acceleration amplitude measured by the piezoelectric sensor on the bearing house of the lathe. Measured values of vibration acceleration amplitude have been processed and evaluated by the SignalExpress software. A set of new knowledge and conclusions is formulated on the basis of the analysis of the created graphical dependences.

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Computation of electromagnetic field generated by multi-parallel power lines and effect of obstacles on their distribution

Billel Ali Rachedi, Abdesselam Babouri

Abstract. Low frequency electric and magnetic fields containing six parallel 60 kV lines, running in Algeria, are simulated. For this reason, a two-dimensional finite element calculation code was developed. Computations are performed at different heights of the human body close to such transmission power lines that operate at the frequency of 50 Hz. Furthermore, the method used in this study allows evaluating the electric and magnetic field distribution at many levels below and above the power lines conductors. Thereafter, the resulting fields are compared with the International Commission on Non Ionizing Radiation Protection (ICNIRP) field guidelines. In addition, the impact of obstacles (such as grounded and floating-potential conductors) on the electric field distribution is studied.

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Calculation methods for determination of electrical load schedules of residential consumers and their indicators

Alexandr Korotkov, Vladimir Frolov

Abstract. Mathematical models based on the results of experimental studies on schedules of electrical residential consumer loads are proposed. These models describe load schedules of consumer's groups of similar characters and are used for developing a method that allows obtaining load schedules and determining their indicators for different parts of electric grids in cities. Load schedules and their indicators are used for exploitation and distribution of grids, as well as for energy savings and efficiency increase.

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Single CCII-based current-mode first-order all-pass inverse filter

Jin Jie

Abstract. A second generation current conveyor based (CCII-based) current-mode first-order all-pass inverse filter (APIF) is proposed in this paper. The proposed circuit employs minimum number of both passive and active components, and it only consists of one CCII, two grounded resistors and one capacitor. As the inverting and non-inverting types of APIF can be realized simultaneously in the circuit, and the output currents are available at high impedance, it is easy cascading for current-mode operation without any impedance matching requirements. All the active and passive sensitivities are low. PSPICE and Cadence post-layout simulation results are provided to verify all the theoretical analysis.

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Impedance and skin effect measurements for a large regular planar copper wire meander

Malcolm S. Raven

Abstract. The design, construction and electrical characteristics of a large copper wire regular planar meander is described. The impedance was measured between 100 Hz and 10 MHz and the results were compared with theoretical calculations. The results generally agree with EM diffusion theory for frequencies up to about 250 kHz. Above this frequency the ac resistance increases above that of the theoretical calculations. The reasons for this are discussed in terms of possible errors in the measuring technique, resonance, and temperature effects. In these measurements a Gain-Phase Meter technique was used to measure low impedances at low frequencies. The measurements were obtained as a continuous function of frequency and agree well with spot measurements using an LCR meter and a transformer ratio arm bridge.

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