Analysis of heat transfer over a plate in porous medium in presence of heat source/sink

Iswar Chandra Mandal, Swati Mukhopadhyay

Abstract. The heat transfer characteristics in a boundary layer forced convective flow of a viscous incompressible fluid past a plate embedded in a Darcy–Forchheimer porous medium in presence of heat source/sink are analyzed. Applying suitable similarity transformations, the governing partial differential equations are reduced to nonlinear ordinary differential equations and are then solved numerically. With increasing heat source/sink parameter the surface temperature increases. The rate of heat transfer increases with the increasing values of the Prandtl number. Temperature overshoot is noted in presence of heat source.

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Chemically reactive solute transfer over an exponentially stretching sheet in porous medium with suction/blowing

Iswar Chandra Mandal, Swati Mukhopadhyay

Abstract. The distribution of solute undergoing first-order chemical reaction in laminar boundary layer flow towards an exponentially stretching porous sheet in a porous medium is presented in this analysis. Similarity transformations are used to convert the partial differential equations corresponding to the momentum and concentration equations into non-linear ordinary differential equations. Numerical solutions of these equations are obtained. It is found that the fluid velocity decreases but the concentration increases with increasing permeability parameter.

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Effect of partial slip on boundary layer mixed convective flow adjacent to a vertical permeable stretching sheet in porous medium

Krishnendu Bhattacharyya,
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Abstract. A steady boundary layer mixed convective flow of Newtonian fluids in a vertical permeable stretching sheet in porous medium is analyzed, with partial slip condition at the boundary. Applying similarity transformations, the self-similar equations are obtained from the governing equations and are solved numerically using the shooting method. From the analysis it reveals that the enhancement of the buoyancy or mixed convection parameter increases the velocity and decreases the temperature. Due to the increase of slip parameter, the momentum boundary layer thickness increases. The Prandtl number has also significant effects on velocity field and for the increase of the Prandtl number, the velocity as well as the velocity boundary layer thickness decrease. Furthermore, the wall skin friction and the rate of heat transfer from the sheet decrease with the increase in slip parameter.

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Thermophoresis effects on MHD combined heat and mass transfer in two-dimensional flow over an inclined radiative isothermal permeable surface

M. Gnaneswara Reddy

Abstract. An analysis is carried out to obtain the flow, heat and mass transfer characteristics of a viscous electrically conducting dissipating fluid having ohmic heating past an inclined radiative isothermal permeable surface, taking into account the effect of thermophoresis and variable thermal conductivity. The Talbot–Cheng–Scheffer–Willis formulation is used to introduce a thermophoretic coefficient into the concentration boundary layer equation. The governing partial differential equations are non-dimensionalized and transformed into a system of nonlinear ordinary differential similarity equations, in a single independent variable. The resulting coupled nonlinear equations are solved under appropriate transformed boundary conditions using the Runge–Kutta fourth-order method along with the shooting method. Comparisons with previously published works are performed and the results are found to be in a very good agreement. Computations are performed for a wide range of the governing flow parameters, viz., magnetic field parameter, thermophoretic coefficient (a function of Knudsen number), Eckert number (viscous heating effect), angle of inclination, thermal conductivity parameter and Schmidt number. The present problem finds applications in optical fiber fabrication, aerosol filter precipitators, particle deposition on hydronautical blades, semiconductor wafer design, thermo-electronics and magnetohydrodynamic energy generators.

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Bit error rate comparision of POMF receiver and adaptive receivers

S. Karthikeyan, P. Ganeshkumar,
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Abstract. A comparative analysis between matched filter receivers and adaptive filter receivers is performed over projected orthogonal matched filter (POMF) receivers. An algorithm is designed for projected orthogonal matched filter receiver based on the quantum signal processing. The algorithm is applied to the speech signal and the bit error rate levels are calculated over a wide range of the signal to noise ratio. The algorithm describes the orthogonality of the measurement vector and imposes an inner product constraint. A new method is developed for choosing a set of measurement vectors that best represent the signals of interest and have a specified inner product structure. The POMF receiver performs correlation of the received signal with that of the original signal. The resultant signal is the same as that of the transmitted speech signal. The performance of POMF receiver is compared with matched filter, recursive least squares (RLS), n-least mean squares (LMS) and Kalman filter receivers. The analysis of the POMF receiver suggests that the bit error rate levels are inferior over a wide range of channel parameters than other type of receivers.

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Single CDTA-based current-mode sinusoidal oscillator

Gang He, Shiqiang Chen, Jie Jin

Abstract. A single current-mode sinusoidal oscillator based on current differencing transconductance amplifier (CDTA) is presented. The proposed circuit structure is very simple, consisting of only one CDTA and four passive components, and it is easy for monolithic integration. The output current is obtained at the high output impedance node, and it can be connected directly to the next stage without any impedance matching requirements. Moreover, the active and passive sensitivities of the oscillator are low. PSpice simulation results are provided to verify all the theoretical analysis.

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Steady state analysis of a two-phase PMSM supplied by a PWM controlled inverter

Pavel Záskalický

Abstract. A steady-state analysis od a two-phase permanent magnet synchronous motor (PMSM) drive, supplied by a voltage-source inverter with pulse-width modulation (PWM), is presented. A complex Fourier series approach is used to predict the output voltage of the inverter and line-current waveforms. The permanent magnet synchronous motor model is obtained from the analogy to fixed-excited synchronous motor. The electromagnetic torque ripple waveform is calculated from the induced voltage and line current waveforms, expressed by means of Fourier series forms.

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A research about breast cancer recognition using different neural networks

Jalil Addeh, Ata Ebrahimzadeh, Milad Azarbad

Abstract. A novel hybrid intelligent method for detection of breast cancer is presented. The proposed method includes two main modules, viz. clustering and classifier modules. In the clustering module, the input data will first be clustered by a new technique. This technique is a suitable combination of the modified imperialist competitive algorithm (MICA) and K-means algorithm. Then the Euclidean distance of each pattern is computed from the determined clusters. The classifier module determines the membership of the patterns using the computed distance. In this module, several neural networks such as the multilayer perceptron, probabilistic neural networks and the radial basis function neural networks are investigated. Using the experimental study, we choose the best classifier to recognize the breast cancer. The proposed system is tested on Wisconsin breast cancer database and the simulation results show that the recommended system exhibits a high accuracy.

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