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Abstract–Heat and mass transfer in boundary layer flow of steady viscous nanofluid past a moving wedge in the presence of magnetic field, radiation, heat generation, chemical reaction, and viscous dissipation are presented in this paper. The prime governing equations are based on the velocity in a nanofluid with a parallel free stream velocity and also surface temperature besides concentration. Similarity transformations are used to transform the equations of governing nonlinear boundary layer for momentum, energy and concentration to a system of nonlinear ordinary differential equations subject to fitting boundary conditions. Numerical elucidations are obtained with the legendary Nachtsheim-Swigert shooting technique along with Runge–Kutta six-order iteration schemes. The effects of the various parameters on the velocity, temperature and concentration are illustrated graphically and discussed in detail. Excellent validation of the present numerical results has been achieved with the earlier published works in literature.

Abstract–Steady boundary layer flow and heat transfer over an exponentially shrinking permeable sheet in presence of magnetic field and thermal radiation are investigated. Instead of no-slip partial slip conditions at the boundary have been considered. Using similarity transformation, the governing partial differential equations are transformed to ordinary differential equations and are then solved numerically with the help of efficient shooting method. From this investigation it is found that the dual solutions for both the velocity and temperature distributions exist for some specific ranges of the pertaining parameters.

Abstract–Two-dimensional flow of a nano-Williamson fluid through a porous medium with radiation in a stretching surface is studied. Williamson fluid model is used to characterize the non-Newtonian fluid behavior. Thermal radiation term is considered in the energy equation. The transformed equations are solved numerically under appropriate boundary conditions using Runga-Kutta fourth order with shooting method. The effects of various pertinent parameters on the Williamson fluid velocity, temperature and nanoparticle volume friction characteristics are depicted through graphs and tables.

Abstract–Magnetohydrodynamic flow and heat transfer characteristics of a non-Newtonian power-law fluid over a non-linearly stretching/shrinking sheet with non-uniform heat generation is studied. The governing non-linear partial differential equations are transformed to a system of ordinary differential equations using similarity transformation before they are solved numerically using Runge-Kutta method coupled with a shooting technique. Graphical solutions for the dimensionless velocity and temperature are presented and discussed for various values of the power-law index parameter n, Prandtl number Pr, Eckert number Ec, heat generation/absorption parameter γ, magnetic parameter $\mathrm{Re_m}$ and suction parameter R. The results of the numerical method are found to be in good agreement with previous published works in the domain.

Abstract–A viscous incompressible electrically conducting MHD fluid flow and heat transfer with radiation is considered in a parallel plate horizontal channel, partially filled with a porous medium and partially with a clear fluid, in the presence of an inclined magnetic field. The channel is rotating with uniform angular velocity about an axis normal to the plates. Hall effects were taken into account. Exact solutions are obtained for the flow, magnetic field and temperature distributions with entropy generation rate. Effects of the rotation parameter R, Hall current parameter m, permeability of the porous material k, viscosities ratio parameter Φ_1, Hartmann number M, and angle of inclination θ of the applied magnetic field H_0 on the velocity and temperature distributions, entropy generation rate and rate of heat transfer are depicted graphically and discussed.

In the proposed work, the recorded accelerometric data after the occurrence of an earthquake event has been analyzed to observe the presence of non-stationarity and directivity effects of signals. In the proposed study, special attention has been given to the non-stationarity in frequency contents of ground motions for studying the statistical properties in frequency contents due to their non-parametric nature. In contrast to displacements inferred through integration of seismic data alone for the characterization of the non-stationary in frequency contents of ground motions, a comprehensive approach to identify the short time amplitude analysis of the waveform signals has been performed in our study. We calculate the zero crossing rates for waveforms for maximizing the correlation between two events that occur on the periodogram output. Our results show that Kalman filter is better in linearizing the system process and measurements and can be used to derive non-stationary characteristics of the future envelope of the response spectra for early detection of earthquake aftershock analysis. Based on the accelerometric data available for the Sikkim Earthquake of 2011 for seismic signature of the earthquake as triggering function for the slip as forecast errors were correlated with elements of the information set. Our results prove that directivity effect of a seismic rupture can be found from acceleration traces.

Abstract–Processes taking place in a long ferromagnetic cylinder that rolls without slipping in the external electromagnetic field are modeled using the Finite Element Method. Electromagnetic field distribution taking into account complicated character of motion of the ferromagnetic cylinder is obtained. Dependence of the magnetic field strength on its speed and value of the external field is investigated.