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| Title | Influence of variable viscosity and thermal conductivity, hydrodynamic, and thermal slips on magnetohydrodynamic micropolar flow: A numerical study | | |
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| Abstract |  |
| Thermophysical and wall-slip effects arise in many areas of nuclear technology. Motivated by such applications, in this article, the collective influence of variable-viscosity, thermal conductivity, velocity and thermal slip effects on a steady two-dimensional magnetohydrodynamic micropolar fluid over a stretching sheet is analyzed numerically. The governing nonlinear partial differential equations have been converted into a system of nonlinear ordinary differential equations using suitable coordinate transformations. The numerical solutions of the problem are expressed in the form of nondimensional velocity and temperature profiles and discussed from their graphical representations. The Nachtsheim-Swigert shooting iteration technique together with the sixth-order Runge-Kutta integration scheme has been applied for the numerical solution. A comparison with the existing results has been done, and an excellent agreement is found. Further validation with the Adomian decomposition method is included for the general model. Interesting features in the heat and momentum characteristics are explored. It is found that a greater thermal slip and thermal conductivity elevate thermal boundary layer thickness. Increasing Prandtl number enhances the Nusselt number at the wall but reduces wall couple stress (microrotation gradient). Temperatures are enhanced with both the magnetic field and viscosity parameter. Increasing momentum (hydrodynamic) slip is found to accelerate the flow and elevate temperatures. | |