# Abstract

Two simple but elegant exact solutions are obtained for the unidirectional motion of an incompressible second grade fluid due to rotational oscillations of a sphere immersed in such a fluid. These solutions, which are presented in terms of a modified Bessel function, reduce to similar solutions corresponding to classical linearly viscous fluids when the normal stress coefficient $\alpha_1 \to 0$.

General solutions for the velocity and the skin friction corresponding to the unsteady MHD free convection flow of an incompressible viscous fluid over an infinite plate with Newtonian heating and constant mass diffusion are determined using Laplace transform technique. Radiative and porosity effects are also taken into consideration. The plate is moving in its plane with an arbitrary time-dependent velocity $f(t)$. The solutions that have been obtained are presented as a sum of mechanical, thermal and mass components. They can be easy particularized to give exact solutions for any motion with technical relevance of this type.