Abstract

In this paper, we present a numerical study of the flow characteristics and heat transfer mechanism of a non- Newtonian fluid in an annular space between two coaxial rotating cylinders taking into account the effect of viscous dissipation. The Carreau stress-strain relation was adopted to model the rheological fluid behavior. The problem is studied when the heated inner cylinder rotates around the common axis with constant angular velocity and the cooled outer cylinder is at the rest. The horizontal endplates are assumed adiabatic. en-house code which is based on a Galerkin mixed finite element is developed to obtain numerical solutions of the omplete governing equations and associated boundary conditions and is validated with the results reported in the literature. It is found that five parameters can describe the problem under consideration, the Reynolds numbers(Re), the Grashof number (Gr), the index of structure (n), Weissenberg number (We) and the Eckert number (Ec). The velocity, temperature and stream function distributions and the local Nusselt number variations are drawn for different dimensionless groups