

Abstract

Toroidal vortex Flows generated by the bottom disk uniform rotation of a vertical free surface cylinder, with a central rod, are studied under the influence of combined buoyancy and surface tension. These thermal conditions result from an external temperature gradient applied between the cylindrical sidewall and the central rod; the remaining boundaries are assumed adiabatic. Calculations indicated that small surface tension gradient are sufficient to alter considerably the flow topology. In particular, very slow secondary meridian circulations are evidenced in the vicinity of the surface, which can decelerate the angular momentum transfer from the bottom rotating disk and prevent the formation of surface stagnation points and reverse flow regions