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Flow of a Second Order Fluid through Constricted Tube with Slip Velocity at Wall Using Integral Method

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Abstract : The steady flow of a second order fluid through constricted tube with slip velocity at wall is modeled and analyzed theoretically. The governing equations are simplified by implying no slip in radial direction. Based on Karman Pohlhausen procedure polynomial solution for axial velocity profile is presented. An expressions for pressure gradient, shear stress, separation and reattachment points and radial velocity are also calculated. The effect of slip and no slip velocity on velocity, shear stress, pressure gradient are discussed and depicted graphically. It is noted that when Reynolds number increases velocity of the fluid decreases in both slip and no slip conditions. It is also found that the wall shear stress, separation and reattachment points are strongly effected by Reynolds number.

Keywords : approximate solution, constricted tube, non-Newtonian fluids, Reynolds number
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