

# Mhd Couette Flow on Viscous Incompressible Fluid through A Vertical Tube with Heat and Mass Transfer

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**Abstract:** *Unsteady flow of dusty viscoelastic fluid through a long uniform tube, whose cross section curvilinear quadrilateral bounded by the areas and radii of two concentric circles under the influence of time varying pressure gradient has been considered expressions for the velocities of liquid and dust particles cases for different pressure gradient have also discussed The flow is driven by the motion of the tube's inner or outer surface, while the vertical orientation introduces the effects of free convection driven by temperature and concentration gradients. A uniform transverse magnetic field is applied, and the governing equations for momentum, energy, and concentration are formulated using the cylindrical coordinate system. These coupled non-linear differential equations are solved either analytically or through numerical techniques like the finite difference method..*

**Keywords:**  $P_{ik}$  - stress tensor,  $u$  - Velocity of liquid,  $\lambda_0$  - Elastic coefficient,  $\mu$  - Viscosity of liquid,  $k$  - The stokes resistance coefficient,  $N_0$  - number of density of the particles,  $\nu$  - Kinematic coefficient of viscosity,  $\rho$  - The density of the fluid,.