Abstract No: 208 ***ICT, Mathematics and Statistics***

EFFECT OF DRAG REDUCTION DUE TO INSERTION OF A POROUS LAYER INSIDE A CYLINDER

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Drag reduction is a physical phenomenon that causes friction to be reduced and fluid flow to be increased. In this study, the drag reduction effect due to the insertion porous layer is studied by considering steady, incompressible, fully developed, viscous fluid flow through two co-axial cylinders. The radius of one cylinder was bigger than the other. The fluid inside the middle cylinder, a free-flow region, is described using the Navier-Stokes equation, and the fluid inside the annular region, which is a porous layer, is described using the Darcy-Brinkman equation. Velocity and the shear stress at the interphase are considered the same. Velocity is finite at *r(*Radius) = 0, and slip boundary conditions at the wall of the cylinder are considered boundary conditions. Velocity profile for the flow inside the cylinder and drag reduction at various permeability (K) values and various thickness (h) layers of porous are presented. It is shown that the drag reduction depends on the values of the permeability parameter and the thickness of the porous layer. When the permeability decreases and the thickness increases, an increase in drag reduction is predicted. Future work will study the drag reduction of the turbulent boundary layer *via* the porous media.

Keywords: Drag reduction, Darcy-Brinkman Equation, Navier-Stokes equation, Permeability, Porous layer.