# MIXED CONVECTION BOUNDARY LAYER FLOW AT THE LOWER STAGNATION POINT OF A SPHERE THROUGH A POROUS MEDIUM IN THE PRESENCE OF HEAT SOURCE/SINK

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## ABSTRACT

The steady mixed convection flow of an incompressible viscous fluid over an isothermal sphere embedded in a porous medium with the existence of heat source/sink is theoretically considered for both the assisting and opposing flow cases. The partial differential equations of the non-similar boundary layer flow are transformed to dimensionless ordinary (similarity) differential equations at the lower stagnation point of the sphere, which are then solved numerically by the shooting method. Numerical results are presented for different values of the porosity, the heat source/sink and the mixed convection parameters for values of the Prandtl number corresponding to air and water, respectively. It is shown that the problem has dual solutions, upper and lower branch solutions in a certain range of the mixed convection parameter. It is also shown that the velocity profiles increase and the temperature profiles decrease with the increase of the mixed convection parameter in the absence of inertial parameter of the porous medium and heat source/sink parameter. Due to increasing values of first-order inertial parameter of the porous medium, the local heat transfer is found to increase in the absence of mixed convection and heat source/sink parameters. It is also noticed that the local heat transfer decreases with the increasing heat source/sink parameters in the absence of first-order inertial and mixed convection parameters.