1020-34-9 **Keith Merrill**, **Matthew Beauchesne**, **Joseph Previte** and **Joseph Paullet***
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Final steady flow near a stagnation point on a vertical surface in a porous medium.

This work investigates the large time (final state flow) solutions for unsteady mixed convection boundary layer flow near a stagnation point on a vertical surface embedded in a Darcian fluid-saturated porous medium. This involves a third order nonlinear ODE boundary value problem. Through numerical computations Nazar *et. al.* [Int. J. Heat and Mass Transfer, Vol. 47, pp 2681-2688 (2004)] concluded that for values of the mixed convection parameter $\lambda > -1$, the BVP had a unique solution. If $\lambda_c \approx -1.4175 < \lambda \leq -1$ two solutions were reported, and if $\lambda < \lambda_c$ then no solutions were found. The purpose of this work is to provide further mathematical and numerical analysis of this problem. We prove existence of a solution to the BVP for all $\lambda > -1$. We also present numerical evidence that a second solution exists for $\lambda > -1$, thus giving dual solutions for all $\lambda > \lambda_c$. It is also proven that if $\lambda < -2.9136$ no solution to the BVP exists. The mathematical techniques employed include topological shooting and direct analysis of the governing ODE. (Received June 12, 2006)