1056-35-1576   **Prince Chidyagwai***, Dept. of Computational & Applied Mathematics, 6100 Main St. - MS 134, Houston, TX 77005, and **Beatrice Riviere**. *On the solution of the coupled Navier-Stokes and Darcy equations.*

We consider a model for the coupled Navier-Stokes and Darcy equations. The Navier-Stokes equations are used to model flow in a free fluid flow domain and Dary's law for the flow in a porous media domain. We will show the existence and uniqueness of a weak solution for the coupled problem. We will propose a numerical method that uses continuous finite elements in the incompressible flow region and discontinuous finite elements in the porous media domain. Numerical results to illustrate the nature of the flows generated and to verify theoretical convergence rates will also be presented. (Received September 22, 2009)