A Dual-Mixed Approximation Method for a Three-Field Model of a Nonlinear Generalized Stokes Problem

V. J. Ervin
Department of Mathwmatical Sciences
Clemson University
Clemson, SC 19634-0975
vjarvin@clemson.edu

J. S. Howell
Department of Mathematical Sciences
Carnegie Mellon University
Pittsburgh, PA 15213
howell4@andrew.cmu.edu

I. Stanculescu
Department of Mathematics
University of Pittsburgh
Pittsburgh, PA 15260
ius1@pitt.edu

Abstract: In this work a dual-mixed approximation of a nonlinear generalized Stokes problem is studied. The problem is analyzed in Sobolev spaces which arise naturally in the problem formulation. Existence and uniqueness results are given and error estimates are derived. It is shown that both lowest-order and higher-order mixed finite elements are suitable for the approximation method. Numerical experiments that support the theoretical results are presented.