

A PRIMAL-DUAL FORMULATION FOR THE BINGHAM FLOW

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ABSTRACT

The Bingham flow is an example of a Stokes-type equation with shear dependent viscosity. Due to a non-differentiability, a regularization of the equations is necessary. It is a well-known fact that applying a nonlinear solver such as Picard or Newton to these equations results in a high number of outer iterations, especially when the regularization parameter is small [1]. In this talk, we will introduce a primal-dual formulation of the Bingham flow, address a few properties of this formulation and its numerical solution. Moreover, we will perform several numerical experiments, among others the Lid-driven cavity test and a case where the analytical solution is known. These experiments indicate a significant reduction in the number of nonlinear iterations over the nonlinear solvers of the equations in their classical formulation in primal variables.

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