

Mathematical modelling of viscoplastic flows

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Yield stress fluid flows play an important role many applications, especially in the oil and gas industry. Numerical simulation the flow of viscoplastic media is not a straightforward task. The main difficulty in design of appropriate solution techniques is related to the non-differentiability of the constitutive relations.

Over the past 40 years, two main family of methods were suggested in the literature: the so-called regularization approach and augmented Lagrangian method. We discuss both and mark their advantages and drawbacks. Besides, we overview field of asymptotic solutions in this area and present new promising results in application of machine learning techniques to the Bingham media modelling.