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Analysis of non-Newtonian Fluid Flows

Fluids that are not adequately described by a linear constitutive relation are usually referred to as "non-Newtonian fluids". In the last 15 years we have seen a significant progress in the mathematical theory of generalized Newtonian fluids, which is an important subclass of non-Newtonian fluids. We present some recent results in the existence theory and in the error analysis for approximate solutions. We will also indicate how these techniques can be generalized to more general constitutive relations.