Uniqueness and regularity of flows of non-Newtonian fluids with critical power-law growth

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We deal with the flows of non-Newtonian fluids in three dimensional setting subjected to the homogeneous Dirichlet boundary condition. Under the natural monotonicity, coercivity and growth condition on the Cauchy stress tensor expressed by a critical power index $p = 11/5$ we show that a Gehring type argument is applicable which allows to improve regularity of any weak solution. Improving further the regularity of weak solutions along a regularity ladder allows to show that actually solution belongs to a uniqueness class provided data of the problem are sufficiently smooth.