Relative Energy Inequality and Weak-Strong Uniqueness for an Isothermal non-Newtonian Compressible Fluid

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Abstract: The presentation deals with three-dimensional nonsteady Navier-Stokes equations for non-Newtonian compressible fluids. We show how to derive the relative energy inequality for the weak solutions to these equations and how to prove that the standard energy inequality implies the relative energy inequality. Consequently, the relative energy inequality allows us to achieve a weak-strong uniqueness result. In other words, we present that the weak solution of the Navier-Stokes system coincides with the strong solution emanated from the same initial conditions as long as the strong solution exists. For this purpose, a new assumption on the coercivity of the viscous stress tensor was introduced along with two natural examples satisfying it.