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Eventual and far-field regularity of some infinite energy solutions to the Navier-Stokes equations

Leray weak solutions are known to exhibit both eventual and far-field regularity. These properties have not been investigated for local Leray solutions, a useful generalized solution class introduced by Lemarie-Rieusset. We establish several eventual and far-field regularity criteria depending on properties of the initial data. These have interesting implications for local Leray solutions with initial data in a wide variety of familiar spaces, e.g. the critical Lebesgue space and the critical, end-point Lorentz space. As an application, we present new regularity criteria for some discretely self-similar solutions to the Navier-Stokes equations.