

## Abstract

In this talk, we show the global regularity and the optimal decay of weak solutions to the generalized Leray problem with critical dissipation. Our method is based on the maximal smoothing effect,  $W^{2,p}(\mathbb{R}^3)$ -type theory of linearization, and the action of the heat semigroup generated by the fractional powers of Laplace operator on distributions with Fourier transforms supported in an annulus. As a by-product, we shall construct a self-similar solution to the three-dimensional Navier-Stokes equations, and more importantly, prove the global regularity and the optimal decay without additional requirement.