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Tuoc Phan* (phan@math.utk.edu). *Well-posedness for the Navier-Stokes equations in critical mixed-norm Lebesgue spaces.*

We revisit the well-known work of Kato on the Cauchy problem in n -dimensional space for the system of Navier-Stokes equations. Local well-posedness and global well-posedness of solutions are established in the class of critical mixed-norm Lebesgue spaces. Being in the mixed-norm Lebesgue spaces, both of the initial data and the solutions could be singular at certain points or decaying to zero at infinity with different rates in different spatial variable directions. Some of these singular rates could be very strong and some of the decaying rates could be significantly slow. Besides other interests, the results of the paper demonstrate the persistence of the anisotropic behavior of the initial data under the evolution. To prove the results, we establish some analysis theory mixed-norm Lebesgue spaces such as Young's inequality, time decaying of solutions for heat equations, the boundedness of the Helmholtz-Leray projection, and the boundedness of the Riesz transforms. These analysis results are topics of independent interests and they are potentially useful in other problems. (Received August 27, 2019)