Research Report（April, 2023- March, 2024）

Enrollment from April 2023 | Department of Pure and Applied Mathematics | Yuta KOIZUMI

I. List of Papers

[1] Y. Koizumi, *Convergence of approximating solutions of the Navier-Stokes equations in higher ordered Sobolev norms*, submitted

II. List of Talks

[1] Y. Koizumi, *Convergence of approximating solutions of the Navier-Stokes equations*, RIMS Workshop on Mathematical Analysis in Fluid and Gas Dynamics, Kyoto Univ., July 6, 2023

[2] Y. Koizumi, *Convergence of approximating solutions of the Navier-Stokes equations*, The 44^{th} Young Researchers Seminar on Evolution Equations, Kyoto University of Education, September 4, 2023

[3] Y. Koizumi, *Convergence of approximating solutions of the Navier-Stokes equations in higher ordered Sobolev norms*, The 49th Evolution Equations Research Meeting, Tokyo University of Science, December 27, 2023

[4] Y. Koizumi, *Convergence of approximating solutions of the Navier-Stokes equations in higher ordered Sobolev norms*, MSJ Spring Meeting 2024, Osaka Metropolitan Univ., March 20, 2024

III. Research Results in AY2023

I considered the nonstationary incompressible Navier-Stokes equations in the n-dimensional Euclidian space. I worked on convergence of approximating solutions (successive approximation) to the strong solution in the topology of higher ordered Sobolev spaces. Based on the argument by Kozono-Okada-Shimizu(2020), I established the Hölder type estimate for the error between the approximating solutions and the mild solution. I obtained the approximation in time weighted higher ordered Sobolev norms jointly in space and time under the assumption that the approximation holds in lower time weighted L^p norms. Here the importance is that all the norms above are scaling invariant.

IV. Research Plan for AY2024

My result shows that the approximation in higher ordered Sobolev norms holds for each fixed parameters such as an integrable exponent and differential orders. I will study the approximation which has uniformness on such parameters. To be precise, I establish a Gevrey type estimate for the error between the approximating solutions and the mild solution.