Research Report（September, 2022- September, 2023）

Enrollment from September 2021　Department of Pure and Applied Mathematics　Tatsuki YAMAMOTO

I. List of Papers

[1] R. Kanamaru and T. Yamamoto, *Logarithmically improved extension criteria involving the pressure for the Navier–Stokes equations in* R*n*, Math. Nachr. **296** (2023), 2859–2876.

II. List of Talks

[1] T. Yamamoto, *Logarithmically improved extension criteria involving the pressure for the Navier–Stokes equations in* R^3, PDE and Analysis seminar, University of Pittsburgh, USA, November 7, 2022

III. Research Results in AY2022

I considered the steady-state Navier-Stokes equations under the nonhomogeneous slip boundary condition in two-dimensional multiply-connected bounded domains. In view of the incompressibility condition of the fluid, the total flux of the fluid over the boundary is required to be zero. For an arbitrary two-dimensional bounded domain, the solvability of the problem under the nonhomogeneous no-slip boundary condition was proved by Korobkov-Pileckas-Russo (2015) under the sole necessary condition on fluxes. In 2022, by applying their method, which is based on Bernoulli's law for solutions to the steady Euler equations, I proved that the problem is solvable if the friction coefficient is sufficiently large, or under certain symmetry assumptions on the domain and the boundary data.

IV. Research Plan for AY2023

I will prove the solvability of the Navier-Stokes problem with nonhomogeneous slip boundary conditions in a two-dimensional exterior domain. Also, I will try to establish the existence theorem in a three-dimensional bounded domain under the assumption that the flux of the velocity vector across each connected component of the boundary vanishes.