Research Report（September, 2018 - September, 2019）

Enrollment from
September 2017

Department of Mathematics　Hiroyuki TSURUMI

I. List of Papers

・H. Tsurumi, ”The two-dimensional stationary Navier-Stokes equations in toroidal Besov spaces”, in preparation.

II. List of Talks

・H. Tsurumi, “Well-posedness and ill-posedness of the stationary Navier-Stokes equations in scaling invariant Besov spaces”, International Conferences on PDEs from fluids, Wuhan University (China), October, 2018.

・H. Tsurumi, “Well-posedness and ill-posedness problems of the stationary Navier-Stokes equations in scaling invariant Besov spaces”, RIMS 共同研究(公開型)『関数空間の一般化とその周辺』, Kyoto University, November, 2018.

・H. Tsurumi, “On the ill-posedness of the stationary Navier-Stokes equations in scaling invariant Besov spaces”, RIMS 共同研究(公開型)『Mathematical Analysis of Viscous Incompressible Fluid』, Kyoto University, December, 2018.

・H. Tsurumi, “Well-posedness and ill-posedness of the stationary Navier-Stokes equations in the scaling invariant Besov space”, 信州微分方程式セミナー, Shinshu University, December, 2018.

・H. Tsurumi, “Besov 空間における定常 Navier-Stokes 方程式の適切・非適切性”, 第 41 回発展方程式若手セミナー, Gunma Pref., August, 2019.

III. Research Results in 2nd year

We considered the stationary Navier-Stokes equations in homogeneous Besov spaces on two dimensional tori. For any $\varepsilon > 0$ and $(p,q) \in ([1,2) \times [1,\infty]) \cup (\{2\} \times [1,2])$, we showed the existence, uniqueness, and continuous dependency of solutions in$\dot{B}^{-1+2/p}_{p+\varepsilon,q}$ for given small external forces in $\dot{B}^{-3+2/p}_{p+\varepsilon,q}$. These spaces become closer to the scaling invariant ones if the difference ε becomes smaller. Furthermore, we showed that such well-posedness property is not generally guaranteed in the rest case of (p,q), by constructing counter examples.

IV. Research Plan for 3rd year

We will apply the above well-posedness and ill-posedness problem to other stationary equations. Also, we will investigate papers on the dissipative weak solutions (Onsager’s conjecture), and consider its application.