Research Report（April, 2021 - March, 2022）

In the SGU course of Mathematical Physical Science: April 2019-March 2022

Conferring university	Degree name (by completing a course / by thesis only)	Date of conferment
Waseda University	Doctor of Science	03 15, 2022

Enrollment from April 2019   Department of Pure and Applied Physics   Kosuke KITA

I. List of Papers

1. K Kita and M Ôtani, On a comparison theorem for parabolic equations with nonlinear boundary conditions, to appear in Adv. Nonlinear Anal.

2. K Kita and M Ôtani, A bound for global solutions of nonlinear heat equations with nonlinear boundary conditions, to appear in Lib. Math. (N.S.).

II. Record of Awards

None

III. List of Talks

1. Convergence of functional associated with Laplacian under nonlinear boundary conditions, 第 42 回発展方程式若手セミナー, via Zoom, Aug. 2021.

2. On the global existence and blow-up of solutions for nonlinear heat equations on bounded domains, 第 47 回発展方程式研究会, via Zoom, 2021 年 12 月.

3. Qualitative theory of solutions to parabolic equations with nonlinear boundary conditions, 大分解析セミナー, 大分大学, 2022 年 2 月.

4. Existence and nonexistence of global solutions for nonlinear heat equations on a bounded domain, 第 18 回数学総合若手研究集会, オンライン開催, 2022 年 3 月.(講演申し込み受理)

5. Research Results in AY 2021

In this academic year, we clarified critical phenomena related to the existence and nonexistence of global solutions for nonlinear heat equations of Fujita-type on a bounded domain from the viewpoint of boundary conditions. More precisely, we showed that there exists a certain nonlinear boundary condition between the homogeneous Dirichlet boundary condition and the homogeneous Neumann boundary condition such that it plays a role of threshold for the existence of global solutions on a bounded domain. Moreover, we also proved that the boundary condition is given as the limit of a nonlinear boundary condition of power type nonlinearity.

6. Summary (From April 2019 to May 2022)

It is regrettable that I was unable to study abroad due to restrictions on overseas travel caused by the COVID-19. On the other hand, I believe that it was a very good experience for me to communicate with mathematicians from all over the world through online conferences using ZOOM organized by Mathematics and Physics Unit of Top Global University Project. Furthermore, it is my great pleasure to have started joint work with Prof. Georgiev of the University of Pisa through the introduction of Prof. Shibata and Prof. Ozawa. This project made my campus life as a doctoral course student very fulfilling.