

Multiscale Analysis, Modeling and Simulation

-Top Global University Project, Waseda University-

REPORT ON STUDY ABROAD

Name: Masayuki Hayashi

Date: October 4, 2018

1. Study Abroad Destination: Instituto de Matemática Pura e Aplicada (IMPA), Brazil

2. Dates of Stay: July 27, 2018 - September 3, 2018 (39 days)

3. Purpose:

To attend ICM and to study nonlinear dispersive equations.

4. Host Professor: Felipe Linares (IMPA)

5. Education and Research Activity in the Destination

During first two weeks I attended International Congress of Mathematicians (ICM) which was held in Rio de Janeiro this year. ICM is held once every four years and prestigious prizes such as the Fields Medals, the Gauss Prize, and the Chern Medal are awarded there. Many great mathematicians gathered at ICM and every invited lectures I attended were really high-level and well-organized. I believe that my first experience attending ICM is invaluable and it will help further progress of my study.

After ICM I studied nonlinear dispersive equations at IMPA. I mainly studied the derivative nonlinear Schrödinger equation (DNLS) from the viewpoints of solitons. DNLS has two types of solitons: one has exponential decay and the other has algebraic decay. Lately I am specifically interested in algebraic solitons which correspond to critical case. I studied these solitons by both variational approach and spectral approach. Recently I finished writing the paper concerning variational arguments on solitons, and have already submitted it to a mathematical journal.

During my stay at IMPA I could have many fruitful discussions with Professor Felipe Linares and PhD students at IMPA. These discussions helped me not only to organize my own research but also to broaden my research area. Through the discussions I could newly notice (reaffirm in some points) several important connection between nonlinear Schrödinger equations with derivative and other nonlinear dispersive equations. These things will surely help further progress of my future study.

6. Other Comments:

My second visit at Rio de Janeiro became an invaluable experience again. I would like to express my gratitude Professor Felipe Linares to his warm hospitality. I am also grateful to my friends at IMPA. I was glad to see them again after a long time. Having such a great experience is completely thanks to "Top Global University Project," Waseda University. I am grateful to Professors Yoshihiro Shibata, Tohru Ozawa and all the staff who are related to this project. Through my twice visit at Brazil I could meet new people, experience, learn new things and grow to appreciate our differences. I really appreciate that Top Global University Project could give me such a precious opportunity.



Figure 1: At a restaurant with my friends studying at IMPA