

# Acknowledgements

The author would like to extend his gratitude sincerely to his direct supervisor, Professor Tetsuo Iguchi, Department of Quantum Engineering, Nagoya University, for the instruction and encouragement throughout the course of this work.

The author would like to heartily appreciate the helpful comments of Professor Mamiko Sasao, Department of Quantum Science and Energy Engineering, Tohoku University, on neutron diagnostics in fusion reactors.

The author would like to thank cordially to his vice-advisor, Professor Kozo Yamazaki, Division of Energy Engineering and Science, Nagoya University, for the valuable comments and instructions on plasma control.

The author also would like to thank heartily to the valuable comments and advice on English expressions of his vice-advisor, Professor Kazuo Soda and Associate Professor Jun Kawarabayashi, Division of Quantum Science and Energy Engineering, Nagoya University.

The author is very grateful to Prof. Osamu Mitarai, Department of General Education, School of Engineering, Kyushu Tokai University, for the teaching on the algorithm of plasma burn control and helpful advice for the composition of this thesis.

The author is sincerely grateful to Dr. Takeo Nishitani, Japan Atomic Energy Agency, for the meaningful advice, discussions and information provisions about the latest fusion research and ITER engineering design activities.

The author is very grateful to Dr. Chris.I.Walker, ITER Garching JWS, Diagnostic Engineering, ITER International Team, for the information provisions about the latest design of the ITER diagnostics and their system integration strategies.

The author would like to appreciate the instructions and advice of Professor Akira Uritani, Division of Materials, Physics and Energy Engineering, Nagoya University.

The author would like to thank to Dr. Michinori Yamauchi, Dr. Kentaro Ochiai and all other operating staffs of Fusion Neutronic source, Japan Atomic Energy Agency, for the arrangements of the experiments using the accelerator neutron source and valuable

comments for this work.

The author is also heartily grateful to Research Associate Kenichi Watanabe, Facility for Nuclear Materials, Nagoya University, for his encouragements, valuable discussions and advice for the experiments and data analyses.

The author would appreciate the instructions and advice of Mr. Hidenori Sawamura, Computer Software Development Co., Ltd, on the Monte Carlo simulation using MCNP, which has much to contribute to this thesis.

The author would thank to COE postdoctoral fellow, Dr. Hideki Tomita, Nagoya University, for his helpful advice, discussions and encouragements throughout this work.

The author would like to sincerely thank to Mr. Teruhisa Matsui, Department of Quantum Engineering, Nagoya University, for the computer instructions, valuable discussions, careful proofreading and a lot of precise comments. The careless mistakes of this thesis could not be corrected without his cooperation.

The author is very grateful to Mr. Yu Takiguchi, Department of Quantum Engineering, Nagoya University, for his advice on English grammar and expression.

The author would like to sincerely thank to Mr. Norihiro Naoi, Department of Quantum Engineering, Nagoya University, for his grateful encouragement, helpful discussions, assistances and the arrangements for the experiments. His advice for the experiments and data analysis was extremely helpful.

The author also thanks to Mr. Tsutomu Kadoi, Mr. Kazuhiro Hattori, Mr. Tomohiro Ogata, Mr. Ryoji Mizuno, Mr. Hiroyasu Ohnishi, Mr. Katunori Aoki, Mr. Daisuke Inui, Mr. Hiroaki Kenjo, Mr. Yuki Higuchi, Mr. Manabu Miyata, Mr. Hisato Takemoto, Mr. Tatsuya Osawa, Mr. Hirano Toshio, Mr. Yusuke Nasu and all other students who have studied in Iguchi laboratory, for their encouragement and cooperation.

Finally, the author gives all of the glory for this work to the Lord.

“Ascribe to the Lord, O mighty ones, ascribe to the Lord glory and strength. Ascribe to the Lord the glory due his name; worship the Lord in the splendor of his holiness.” (Psalm 29:2)

Keisuke Asai