

# Internship at Tohoku University

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My internship at Tohoku university was an enriching experience. My research area was “numerical analysis of bioheat transfer during laser irradiation of biological tissues”. During my five months stay at Tohoku university, I learned many new scientific methodologies, specially computational methods and numerical implementation of problems. Biological heat transfer modeling and simulation in 2-d and 3-d domain with simultaneous solutions of radiative and conductive mode were performed. Through many discussions with Prof. Maruyama, Dr. Okajima and student members of Maruyama/Okajima/Komiya laboratory, I learned practical aspects of simulating new problems in the area of bioheat transfer and laser induced hyperthermia.



During Imoni party with lab members

I got insight of possibilities and limitations of numerical simulations and their applications in real life medical applications. Problems such as overheating of tissue surface and thermal damage to healthy tissues were taken up and solutions such as surface cooling device was proposed. Through numerical simulation using this device, a simultaneous laser irradiation and cooling was demonstrated, and a better temperature control method is proposed.



With Prof. Maruyama and his lab members at my farewell party

Many members of Maruyama/Okajima/Komiya laboratory are working in the area of bioheat transfer, lasers in medicine and biology and radiation heat transfer. Since all these were required for my field, this lab. Was an ideal place for research in my area, i.e. Bioheat transfer analysis. Invaluable experience of lab members, both in numerical and

experimental aspects of heat transfer, laser and optics system and computational techniques, helped me in in-depth understanding of subject matter.



At Sendai Castle

With the current results of simultaneous cooling and laser heating during thermal therapy, this work can immediately be extended for non-Fourier models of bioheat transfer, which is highly suitable non-homogeneous medium like biological tissues. Currently I am working on this aspect and in near future I expect some results of more realistic nature. I would like to thanks GCOE program for supporting my internship at ifs, Tohoku university, without that it would not have been possible.



Mountain trip with Prof. S. Maruyama

Living in Sendai, Japan was an experience of lifetime. People here are very

kind, helping nature and supportive. Japanese food was very delicious and healthy. Weather of Sendai was very nice and i enjoyed the snow very much. The officials of GCOE office were very supportive and kind. All the aspects of my stay in Japan were taken care of very well and everything was well planned.



Friendship Night during ICFD 2012

Once again I would like to thanks every officials and staff of GCOE, and Tohoku university for all the support and generosity.



University main entrance during snow

In future, I am hopeful for an active and fruitful relation with Prof. S. Maruyama, Dr. Komiya and Dr. Okajima and student members of the laboratory.