Modeling and Active Vibration Control of a Linkage Structure in a Scanning Tunneling Microscope

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approved treatise

by
Jun Lu
born in Yancheng (China)

First reviewer: Prof. Dr.–Ing. Prof. E.h. Peter Eberhard
Second reviewer: Jun.–Prof. Dr. rer. nat. Dipl.–Phys. Syn Schmitt

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Preface

I still remember how nervous I was before I met Prof. Dr.-Ing. Prof. E.h. Peter Eberhard for the first time in China when I was still a young student in Nanjing University of Science and Technology. I never forget that moment when he came downstairs with a kind smile to me, shaking hands with me, very warmly. I suddenly relaxed.

Later on with the recommendations of Prof. Dr.-Ing. Prof. E.h. Peter Eberhard's and Prof. Xiaoting Rui's, I got the precious chance to be enrolled as a master student by the COMMAS course at the University of Stuttgart, from which I entered the world of computational mechanics with the background of electrical engineering. My life in this beautiful campus in Vaihingen started, where is considered to be my second hometown in my heart.

When I told Prof. Dr.-Ing. Prof. E.h. Eberhard that I was interested in the combination of the theories of multibody system dynamics and digital control as the topic for my master thesis, he gave me his suggestions with careful considerations and then introduced Dr.-Ing Alexandra Ast as my tutor. Since then I stepped into my academic life with the topic of active vibration control of a Scanning Tunneling Microscope as a cooperation between the Institute of Engineering and Computational Mechanics (ITM) and the Max-Planck-Institute for Solid State Research in Stuttgart under the supervisions of Prof. Dr.-Ing. Prof. E.h. Eberhard's and Dr. Christian Ast's. I sincerely appreciate a lot that so many great supports were coming from them.

During my time at ITM, I enjoy the warm and friendly atmosphere here. I would memorize all the wonderful annual ITM activities. I enjoy the excursions to different mountain areas to share the leisure time and beautiful sceneries together with colleagues. I enjoy the industry visits, from which I could have a direct sense of the sophisticated technologies in Germany. I enjoy the annual status seminar, from which all colleagues can share different topics and ideas. I also enjoy the Christmas parties, we can enjoy Christmas sweets and Glühwein with a lot of interesting topics. So many happy remembrances of the days at ITM!

Besides, I have benefited a lot daily from the colleagues at ITM. They all supported me without any hesitation whenever I need help. Many thanks to Dr.-Ing Alexandra

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Great appreciations must go to Dr. Christian Ast and his STM research group at the Max-Planck-Institute for Solid State Research in Stuttgart. Without them I could not have so great experimental environment to do the experiments with the STM machine.

Finally, I would like to express my love and gratitude to my parents and my husband. Without their unconditional supports and deep love I could not expect the accomplishment of this thesis.

Shanghai, February 2016 Jun Lu

To my family

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