Quantification of fluid-structure interaction effects during water hammer in piping systems

Quantifizierung der Fluid-Struktur Wechselwirkungseffekte bei Druckstößen in Rohrleitungssystemen

Der Technischen Fakultät
der Friedrich-Alexander-Universität
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zur
Erlangung des Doktorgrades Dr.-Ing.

vorgelegt von

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aus Forchheim

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Preface

This thesis was created during my employment as research engineer at the Institute of Process Machinery and Systems Engineering of the Friedrich-Alexander-Universität Erlangen-Nürnberg. I would like to thank several people who contributed to the successful completion of my thesis.

The first person is my supervisor Prof. Dr. Stefan Becker. I know him for nearly ten years now – from the basics of fluid mechanics to the defense of my thesis. He sparked my interest in fluid flows and helped me with my employment at the institute. We had a lot of constructive discussions and I appreciate his sociable character. Furthermore, he gave me a lot of freedom considering my scientific research. Thank you Stefan! I am glad that we stay in contact because of a joint project.

I also want to thank Prof. Dr. Eberhard Schlücker, who welcomed me at his institute and helped me to find an interesting research project. Additionally, he chaired the defense of my thesis. I enjoyed working at his institute. Thank you for your support!

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Prof. Dr. Kai Willner officially was the nonspecialist reviewer of my thesis. However, in my case, this title is strongly misleading. I know him as good lecturer from the studies of mechanical engineering. I am very glad that he was part of the thesis committee. Thank you!

The next block considers various people of the industry partner AREVA GmbH. When I had technical questions Dr. Werner Schnellhammer was always a reliable contact person for me. Even after his retirement, he joined the project meetings and enriched them with his knowledge. He taught me how to handle complex problems. Thank you very much Dr. Schnellhammer!

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Moreover, I would like to thank my predecessor Dr. Andreas Ismaier for constructing the water hammer test rig and performing the first measurements. I think he did a great job and I immediately could start with experiments. Thank you Andreas!

Special thanks are due to my office colleagues Silke Hohls, Sven Münsterjohann, Matthias Springer and Till Heinemann. With you, there was a very nice working atmosphere. We helped each other and often had fruitful technical discussions. Occasionally, the office DJ played a song to improve the general mood after a long working day. My dog was also part of our team, which was made possible by Dr. Lüder Depmeier – thank you very much. Cindy helped to overcome times of listlessness and took care of the carpet. Thank you for the nice time!

I shared the test rig with Andreas Köhler. I would like to thank him for the uncomplicated cooperation and the mutual assistance.

When you work with a 70 m long test facility, you need support with various tasks such as design, construction, measurement technology and montage. Fortunately, I found a lot of help from lots of people at the institute: Claus Bakeberg, Alexander Beer, Werner Sippl, Piotr Reichel-Lesnianski, Oliver Weisert, Werner Polster, Bao Dinh Nguyen, Stefan Grünwald, Alexander Reichenberg and Florian Holler. Thank you!

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I also would like to thank my grandmother Dorothea Riedelmeier, who supported me and provided her car when I had to drive to the university. Thank you Oma! In this context, I have to mention my deceased grandfather Alfred Riedelmeier† and my uncle Klaus Riedelmeier†, who were very interested in my studies.

Of course my parents also joined the defense. Sabine and Wolfgang Riedelmeier supported me my whole life. They teached me to be down-to-earth and have made me the person I am today – special thanks to you!

My girlfriend Jessica was very patient and had a lot of sympathy for my situation. I am very grateful to you. I think you were as happy as I was when I finished my thesis. I am looking forward to our additional time, which we now have together.

Forchheim, in December 2016
Stefan Riedelmeier

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