Foreword

The research results presented in this thesis were generated in the subproject “ “ of the Advanced Wellbore Transport Modelling (AdWell) research project. The AdWell projected was initiated by a research consortium (NTNU IRIS, SINTEF, UiS, STATOIL and Neptun Energy) in 2012 and was mainly funded by the Research Council of Norway (RCN). The major objective was to enhance the understanding of the complex physics of cuttings transport by means of (partly intertwined) numerical and experimental investigations in order to gain knowledge to built improved Real-Time (RT) models relevant for the (Norwegian) drilling industry.

Fig xx shows the architecture of the AdWell project. This thesis, Milads thesis, IAsaks theis,

Other activities in the AdWell project included experimental cuttings transport investigations (cite Milads thesis), the experimental and numerical modeling of drill string vibrations, as well as supporting activities such as Direct Numerical Simulations (DNS), modeling framework definitions, and development of coarser real-time (RT) models.

The concept of the AdWell project was to link experimental and numerical approaches to investigate cuttings transport and generate a better physical understanding of the involved physical processes and effects. Hence, Phd2 and PhD3 had a close collaboration and worked jointly on some topics.

The work presented in this thesis was mainly conducted at the Fluid Mechanics Group of the Energy and Process Technology Department at NTNU/Trondheim and SINTEF Industry/Trondheim. Some experimental data was generated in the laboratories of SINTEF Petroleum AS/Bergen and the NTNUS’s Institure for Petroleum technology/Trondheim, as well as the University of Stavanger (UiS).

**Acknowledgement**

My sincerest thanks go to my first supervisor Stein Tore Johansen for allowing and encouraging me to pursue my own ideas, while ensuring that each of these were developed further in a scientific and physical sound manner, for his helpful advices, support and always-positive attitude. In addition, I am particularly thankful for his patience during the first years of my PhD when I had a lot to learn and condense. atch up with.

on planned schedule and agreed deadlines.. , two I would like to thank my supervisor professor Stein Tore Johansen, his helpful advices, support and

always-positive attitude certainly enriched the work and kept the moral high. I would

also like to thank my co-advisor Alf Glein Melby from SINTEF Petroleum.

My colleagues from SINTEF Petroleum have been a vital part of my work. Jan David

Ytrehus gave helpful support with his project management skills and Ali Taghipour with

his technical expertise and creative solutions. I am grateful for their support and time.

I would also like to thank Velaug Myrseth Oltedal, Arild Saasen, and Bjørnar Lund for

their technical advice and thought-provoking discussions. Their professional attitude

was always a pleasure to work with and their experience and knowledge certainly

improved my work.

The experimental work done by master students Dias Assembayev, Adil Isgandarzada,

Birgitte Ruud Kosberg, Espen Johansen, and Gunnar Lia Giil, is also highly appreciated.

My friends and colleagues from the department have contributed immensely to my

personal and professional time at NTNU. Especially to mention is Sneha Sayindla, who I

worked together and shared an office with the last three years. I want to thank her for

the good teamwork and cooperation. Also cleaning a fluid tank from oil-based mud is just

not the same alone.

Gratefully acknowledged are my family and my friends. Their support kept my spirit up.

I want to thank Ingrid for her support, patience, and for her motivational words, when I

needed them.

The financial and technical supports from the Norwegian Research Council, Aker BP,

and Statoil are also gratefully acknowledged.