DESIGN AND DEVELOPMENT OF AN EXPERIMENTAL SET UP TO MEASURE BUCKLING AND LATERAL VIBRATION OF DRILLSTRING IN OIL DRILLING OPERATION

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MAY 2009

AUTHOR DECLARATION

"I declared that this thesis is the result of my own work except the ideas and summaries which I clarified their sources. The thesis has not been accepted for any degree and is not concurrently submitted in the candidature of any degree."

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ACKNOWLEDGEMENT

I would like to express my sincere gratitude and appreciation to my supervisor, Dato' Prof. Dr. Ir. Hj. Mohamed Dahalan Mohamed Ramli for his continue support, generous guidance, help patience and encouragement in the duration of the thesis preparation until its completion.

Special credit to Mr. Nik Zahir Nik Mohd Idris (S&V Teknik Sdn. Bhd.) for his advices and ideas regarding the study of this thesis. Thank you to fellow colleague, Sharul Nizam bin Mat Rejab (FKE) and Mohd Faizul (FKM), for his collaboration during the course of completing of my final year projects.

Not to forget, I would also like to express deep appreciation to lab technician, Mr. Mohd Fauzi for spending so much time and ideas in order for me to finish this report properly.

Last but not least, I would also want to thank to my family and everyone who has contributed towards this thesis completed. These contributions are really meaningful to me. To all of you, I really appreciate your contributions. Thank you very much.

ABSTRACT

Drillstring vibrations are one of the causes of premature failure in drillstring drilling operation. The most vital vibration mode is lateral vibration. It causes two categories of failure; buckling of the drillstring and forward and backward whirl vibration. Downtime due to drillstring failure is a major source of drilling cost. In this study, an experimental set up has been designed and developed to simulate an oil drilling operation to appropriate scale. This experimental rig is used to measure the buckling and lateral vibrations. A DC motor is used as the prime mover to rotate a shaft (hollow slender copper rod), which represents a drillstring. The motor rotated the shaft onto a hard surface and axial loading are introduced to the shaft. The behavior of the shaft is recorded by using Laser Doppler Vibrometer (LDV) and the digital processed signals are computationally recorded. The result from experiment can be analyzed by focusing on deflection mode of the shaft under axial loading and unconfined rotation motion.

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