Proceedings of the 10th National Technical Seminar on Underwater System Technology 2018

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NUSYS'18

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Initial Study of Multiple Excitation Source for Electrical Resistance Tomography in Steel Pipe Application

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Abstract Tomography is a method of reconstructing the image of an object's interest within the sensing zone. Electrical Resistance Tomography (ERT) system operates when using current as an excitation source and output voltage is measured at the detection electrode and the research will result in the changes of electric potential distribution. A lot of researches have been made using ERT to identify a liquid-gas regime in the steel pipe focused on improving image resolution of the regime. However, a common excitation source of ERT used only a single excitation. Thus, this research uses COMSOL Multiphysics as a platform for simulation of multiple excitations of electrical resistance tomography for liquid-gas regime identification in steel pipe. The analysis and performance of new simulation which applies multiple excitation sources have been compared with the single excitation. Besides, the project is limited to 54 mm inner diameter of a steel pipe. As a conclusion, 50% of the excitation source can increase the image resolution of those regimes especially in the middle of the steel pipe.

Keywords ERT · Multiple excitation source · Steel pipe

1 Introduction

Tomography comes from Greek word, 'Tomos' means section and 'graphy' means image [1]. In other words, tomography can be a method of reconstructing the image of an object's interest within the sensing zone. Industrial process tomography involves the measured signal from sensors located around an object such as a pipeline that can be implemented for industry purpose. By using an array of sensor, it can identify the medium concentration and a movement of an object interest inside the vessel by forming a cross-sectional image. One of the most favourite popular technique of

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