

Short Commentaries for Imaging of Gas-liquid Annular Flows for Underbalanced Drilling Using Electrical Resistance Tomography

Wei N^{1*}, Jia JB², Yu X¹, Faraj Y², Wang Q², Meng YF¹, Wang M², Sun WT¹

¹Sate Key Laboratory of O&G Reservoir Geology and Exploitation, Southwest Petroleum University, China

²School of Process and Chemical Engineering, University of Leeds, LS2 9JT, UK

*Corresponding author: Wei N, Sate Key Laboratory of O&G Reservoir Geology and Exploitation, Southwest Petroleum University, China, Tel: 8613518163748; E-mail: weina8081@163.com

Received date: February 26, 2016; Accepted date: March 07, 2016; Published date: March 13, 2016

Copyright: © 2016 Na W, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Introduction

The paper may be of particular interest to the readers as it presented a unsteady flow phenomenon of annular flow recognition which would occur during underbalanced drilling. This paper presents a feasibility study on calculation of gas volume fraction and visualisation of flow regimes in gas-liquid upwards annular flow using ERT. Experiments were conducted at three flow regimes, namely bubble, transition pseudo-static and slug. Gas volume fraction profiles were reconstructed with the modified sensitivity coefficient back projection method (MSBP) with a sensitivity map generated from an annular finite element mesh respectively. Flow regimes were visualised by axial images stacked from diameter-pixels of 2D tomograms reconstructed with the conjugate gradient method (SCG). Although tomographic images cannot be as clear as the photographs captured during the measurements, ERT is still able to provide enough information regarding the prevailing flow regime within the annulus. The air

volume fraction profiles in the annulus region, produced from the ERT, indicate a good agreement between the profiles and visual observation (photographs). The stacked images are reasonably accurate representation of air water in the annulus region for the conditions used in this study [1-3].

References

1. Barber DC, Brown B (1984) Applied potential tomography. *J Phys E Sci Instrum* 17: 723-733.
2. Bourgoyne Jr, Adam T (1995) Rotating Control Head Applications Increasing. *Oil & Gas Journal* 93: 72.
3. Ghosh S, Pratihari DK, Maiti B, Das PK (2013) Automatic classification of vertical counter-current two phase flow by capturing hydrodynamic characteristics through objective descriptions. *International Journal of Multiphase Flow* 52: 102-120.