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

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Introduction

The paper may be of particular interest to the readers as it presented an 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