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Liquid Distribution and Hold-up Measurement in Counter Current Flow Packed Column by Electrical Capacitance Tomography

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Abstract: In order to meet the requirements and well suit for in-situ process measurement of industrial scale gas-liquid mass transfer applications, such as natural gas processing and post-combustion carbon capture, electrical capacitance tomography (ECT) is used to analyse the distribution of a liquid phase across the packing of a counter current gas-liquid packed column and to quantify the liquid hold-up. The new method eliminates the requirement of a fully flooded reference calibration and only requires vacant and dry calibration steps. The calculation procedure is simplified by using a normal sensitivity matrix which does not include the packing information. The validity of the proposed method was confirmed through finite element method (FEM) analysis studies to certificate neither packing geometry nor orientation relative to the tomography probe nor had a significant impact on phase identification. An experiment is conducted on a counter current gas-liquid packed bed column with 190mm diameter and polypropylene Sulzer Mellapak 250 Y as the packing. According to the experiment with various liquid load, the inclination angle of

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