New methods for interface detection using Electrical Resistance Tomography

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Abstract

Detection of a phase boundary or interface is a parameter to a number of mixing processes. For example, the cloud height of mixing solids in liquid or the detection of a phase boundary between two immiscible phases following intense mixing during an extraction process.

Point based measurement techniques are inappropriate for these measurements and ERT proved to be a successful tool in these application areas.

Generally linear ERT probes have been based around reconstruction methods such as Linear Back Projection which offer qualitative information on interface positions.

We will report on the design of a novel probe and the implementation of a new sensing methodology to improve the quality of data produced for two phase systems. Results will be presented where this has been used to resolve the position of interfaces in two and three phase systems.

A parametric reconstruction method has also been developed alongside an operation GUI. The algorithm has been optimized to find the positions of the two phases and then calculate the gradient across the zone of separation. This has been used to determine the concentrations for settling/separating systems. Preliminary results will be presented.

Combining these methods should have applications in the nuclear, petrochem, biotech and consumer product industries.