

## A comparative study on ultrasonic transceiver sensing array for bubbly gas hold ups

### Introduction

Ultrasonic tomography technique uses ultrasound to detect the changes of acoustic impedance ( $Z$ ) which is closely related to density (symbol) of the media ( $Z = \rho c$ , where  $c$  is the velocity of the sound) (1). An ultrasonic tomography system is based upon interaction between the incident ultrasonic waves (frequency of 20 kHz to 10MHz) and the object to be imaged [2]. Whenever there is an interface between one substance and another, the ultrasonic wave is strongly reflected [3] and this type of tomography technique has the advantage of imaging two components flow and gives the opportunity of providing the quantitative and real-time data on chemical media within a full scale industrial process [3]. However ultrasound has several specific problems which may limit its application. The speed of sound in gas limits the data acquisition rate and particle impact on the flow pipe may produce very high levels of noise at the transducer [4].