# DEVELOPMENT AND VALIDATION OF A X-RAY TOMOGRAPH FOR TWO-PHASE FLOWS

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**Abstract**

This paper describes the development and validation of a high spatial resolution X-ray tomograph devoted to investigate air-water two-phase flows.

The device hardware is mainly composed of a 60 keV X-ray source, a detector and an accurate mechanical bench.

This paper concentrates on accuracy quantification and emphasis is given on the reconstruction procedure. It is well known that absorption gradients induce reconstruction artifacts when using standard algorithms based on uniform regularization. In the particular case of two-phase flows in pipes, this leads to a poor measurement accuracy in the vicinity of the walls. To overcome such effects, enhanced algorithms have been developed in this study, involving different spatially adaptative regularization methods.

A first calibration performed on static phantoms clearly exhibits the benefit brought by such advanced reconstruction algorithms.

A validation procedure has been carried out on an air-water bubble column, equipped with an optical probe which can be translated in order to explore the 80 mm $\times$ 80 mm square cross section. Comparisons of local void fraction measurements have been performed *pixel by pixel*, and demonstrate the accuracy improvement induced by the advanced reconstruction algorithms.