

CANTY FLOW VISUALIZATION SYSTEM

Canty visualization system is a custom-made, non-intrusive flow visualization tool used for flow pattern observation, liquid holdup and liquid wetted wall fraction measurements. In the Canty visualization system, a chamber surrounds the acrylic section and is welded to the steel pipe pieces (Figure 1). The chamber is pressurized keeping the stress over the acrylic section below a critical value to ensure system integrity. This system is typically used in experiments under elevated pressure conditions.

This flow diagnostic tool facilitates the use of light sources and cameras, which are located around the circumference of the pipe. The two light sources (HYL 250 Watt) are located at a 180° from each other. A JMCanty still picture process camera is located at a 90° from the light. The resolution of this camera is 1600×1200 pixels. The system is equipped with a side window located at a 90° from the light, where another camera (high speed camera as shown in Figure 1) or a third light source can be connected.

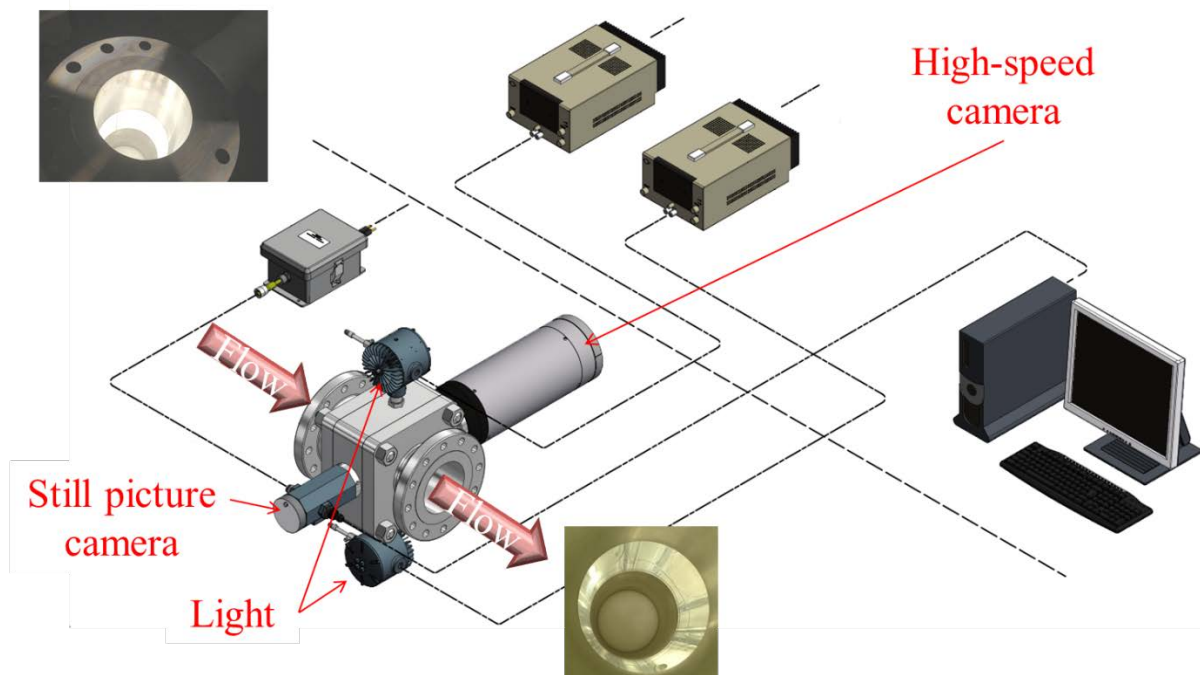


Figure 1. Canty Flow Visualization System.

In addition to the flow pattern observations, the Canty flow visualization system can also be used to measure the liquid holdup. For this measurement, the Canty device is installed in between two quick closing valves (QCVs) to obtain snapshots of the trapped fluids instead of measuring the wetted perimeter by a measuring tape. In this method,

the static oil-gas interface can be identified at a certain position along the vertical line in Figure 2 (picture on the right hand side). Two points located at the oil-gas interface can be used to calculate the pixel bandwidth, which is directly related to the liquid holdup in the pipe cross-section. This method has been tested on a bench scale setup (photograph on the left hand side of Figure 2), and the results are given in Figure 3. Also, a similar methodology can be used to quantify the wetted wall perimeter by analyzing the images recorded by the cameras under dynamic flow conditions, and relating the calculated pixel bandwidth to the calibration results (Figure 4).

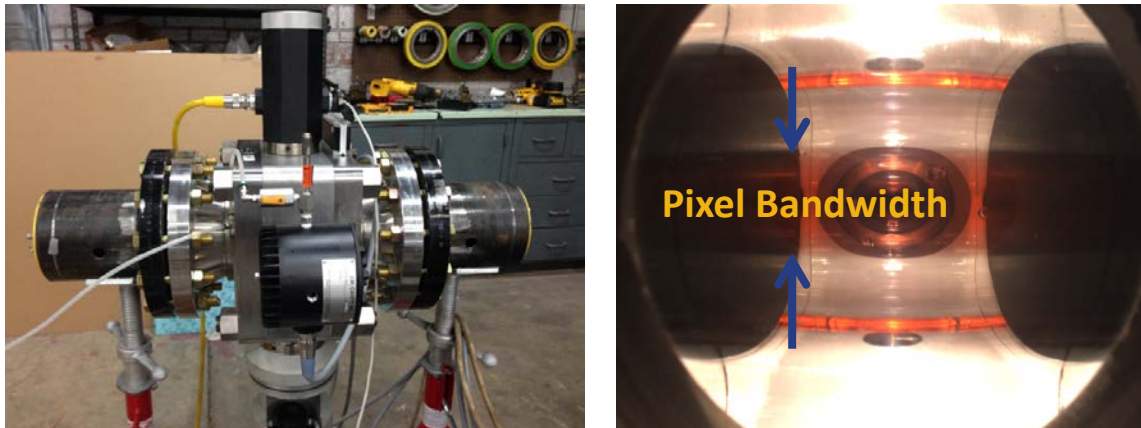


Figure 2. Test setup for the measurements of liquid holdup and wetted wall fraction using Canty device (left) and a sample picture together with the pixel bandwidth used in the system calibrations (right).

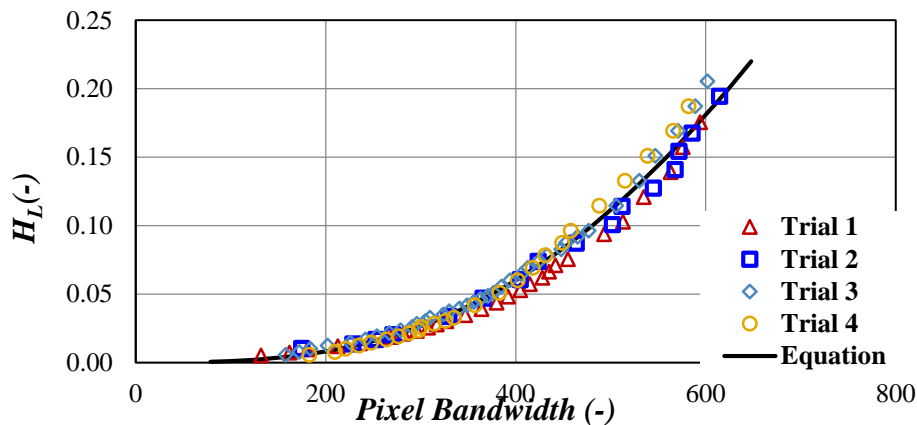


Figure 3. Calibration of the holdup measurements using Canty device.

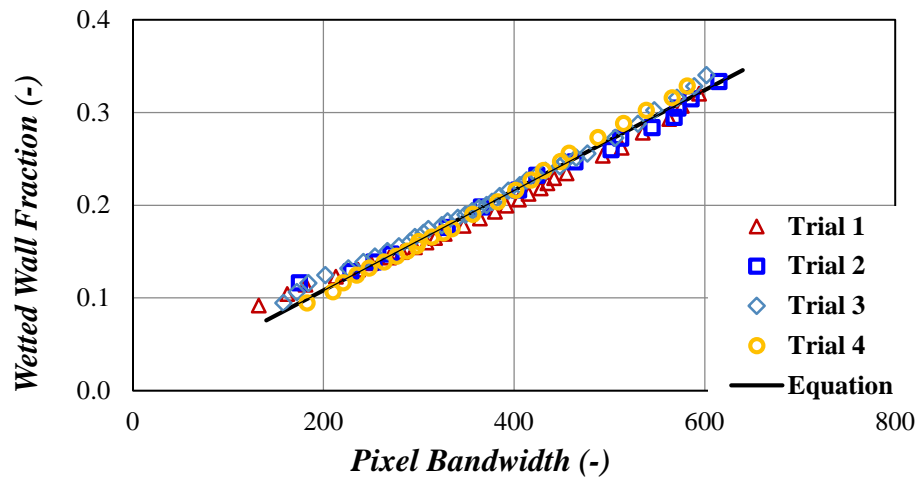


Figure 4. Calibration of the wetted wall fraction measurements using Canty device.