



THERMOGRAPHY ANALYSIS OF TURBULENT MIXING PROCESS IN T-JUNCTION CROSS-FLOW

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Fluid: water

Visualization method(s): thermography

Other keywords: non-isothermal, T-junction

ABSTRACT: The flow field in the T-junction mixing two fluids with different temperatures was studied experimentally. This study was conducted to clarify the turbulent pulsations frequency and amplitude. When the fluid temperature fluctuation is transferred to the wall and further converted to the stress, frequency of the fluctuation has a significant influence. In recent years, a lot of researches on non-isothermal mixing of liquids devoted to investigation of flows in a T-shaped configuration of pipes (T-junction). These non-isothermal flows are, in general, spatial, unsteady, and unstable; fluctuations occur near the surface and volume flow. Flows visualization is a difficult problem. The main practical interest in this case is formation of experimental data for validation of CFD-calculations. The usual way of researches is in combining of velocity distributions measurements with a PIV and LDV systems and temperature measurements with thermocouples [1].

The IR technique is a non-contact, non-destructive test method. To obtain the temperature fields in mixing area of plane T-junction, a calibrated, midwave (3,7-4,8 μm) infrared camera (FLIR Systems) was used. Walls of rectangular tubes were of steel, copper; IR transparent glasses were also mounted in the channel. Quantitative time-resolved visualization of high speed process was conducted. Turbulent pulsations frequency and amplitude were measured, depending on water temperature, wall thickness and material.

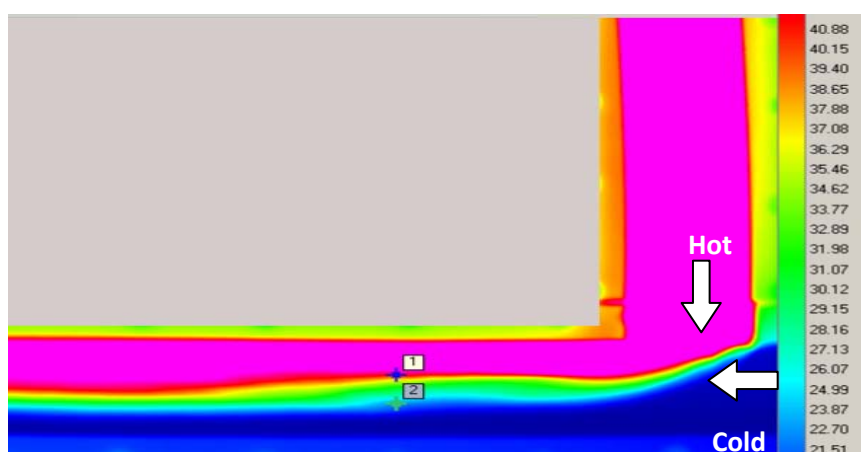


Fig.1 IR instant image of T-junction mixing zone.

References

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