

Visualization and PDA Measurement of Spray inside a Thermostatic Expansion Valve

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Abstract

Thermostatic expansion valves (TEV) are expansion devices commonly used in air-conditioning system which involves the spray and atomization process of the refrigerant. The process was studied by introducing a valve with optical access. The break-up and atomization of the refrigerant were visualized near the outlet of the orifice under different feed conditions on micro-second scale. A Phase Doppler Anemometry (PDA) was used later to measure the size of individual droplets passing the location at the outlet of the orifice and provide drops size distribution (DSD) data. In addition, the effect of the feeding pressure was analyzed by measuring the DSD at same locations with different pressure value. Through this study, a better understanding of the expansion process inside the TEV is gained which will lead to better design and control optimization.

Key words: Thermostatic expansion valve, break-up regime, PDA