Surface Tension Measurement of Ethyl Fluoride Using an Adjusted Differential Capillary Rise Apparatus

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A highly accurate apparatus based on the differential capillary rise method (DCRM) was designed to investigate the surface tension of saturated liquid. The differential heights of liquid rising in the capillary were obtained by image processing technology, for which a CCD camera and cylinder stainless steel ruler were used. The apparatus was tested with pure R600a along the saturation line from (273.15 to 343.15) K, and the maximum deviations were better than 0.16 $mN \cdot m^{-1}$ compared with literature values. The surface tension of ethyl fluoride was measured over the temperature range from (244 to 334) K. The result showed that the uncertainties of measurements for the temperature and surface tension were estimated to be within ±10 mK and 0.13 $mN \cdot m^{-1}$. The results were correlated as a function of temperature, the maximum deviation and the average absolute deviations were 0.095$mN \cdot m^{-1}$ and 0.083$mN \cdot m^{-1}$, respectively.