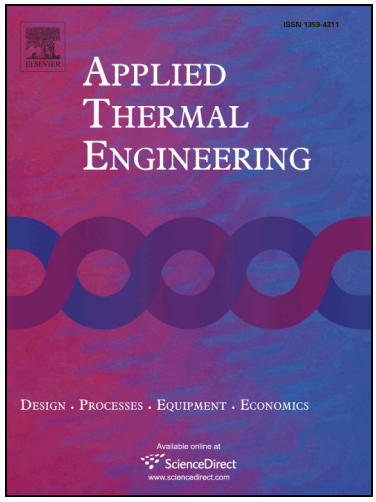

Low cost and new design of Transient Hot-Wire technique for the thermal conductivity measurement of fluids

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Low cost and new design of Transient Hot-Wire technique for the thermal conductivity measurement of fluids

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Abstract

A low cost transient hot-wire device for the measurement of the fluid's thermal conductivity has been constructed and evaluated. The transient hot-wire is designed so that the thermal conductivity could be measured with the same accuracy of the conventional methods. A copper micro-wire of 80 μm diameter was chosen in contrast to conventional transient hot wire devices which use platinum wire. In transient hot wire the copper wire acts as both heat source and temperature detector. Two stimulation currents were applied to heat the wire and unbalance the Wheatstone bridge using direct and alternating electrical currents, respectively. In this way, known and cheap resistances of the Wheatstone bridge not heated due to electrical stimulation. In fact, the source of heating copper wire was separated from the excitation source of Wheatstone bridge. The measurements were done in temperatures ranges from 5 to 50℃ for deionized water and ethylene glycol. It was estimated that, the average uncertainties of the measurement for deionized water and ethylene glycol are ±1.2% and ±0.9%, respectively. The good

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