

Thermal wave interferometry of gas-liquid using optical fibre thermal wave resonator cavity

Abstract

The optical fibre thermal wave resonator cavity (OF-TWRC) technique was used to measure thermal diffusivity of a two-layer sample; air-liquid. The thermal waves were generated by transmitting the modulated laser beam through one end of optical fibre and illuminating the other fibre end surface that metalised with silver paint. The cavity length scan was done by moving the fibre end surface towards the pyroelectric detector continuously through air and then into the liquid. A good linear relationship of pyroelectric amplitude with respect to cavity length was obtained in thermally thick region in both media; air and liquid. The thermal diffusivity of air, glycerol and water obtained were closed to the literature values.

Keyword: Thermal wave; Fibre optics; Thermal diffusivity.