

## Infrared thermography for local Nusselt number estimation of an elliptical fin with a transient method

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## Abstract

In this paper, a transient method involving an infrared set-up is used to investigate local heat transfer over the fin of the second row of a staggered elliptical finned tube heat exchanger assembly. An experimental test bench was designed to record data during the fin cooling. The procedure of data preprocessing including IR camera calibration is presented. It allows extracting the temperature field evolution of the fin. These temperatures feed a numerical model that works with thermally thin material and takes into account lateral heat conduction and radiation with the surrounding. The heat transfer coefficient field is determined by integrating the model over time intervals that depend on space. Distributions of Nusselt number over the fin and their uncertainties are presented for several Reynolds numbers. The high resolution of the whole method and set-up allows detecting thermal imprints of developing horseshoe vortices.

This paper was published in the QIRT Journal 11.1