

## **Numerical simulation of plain fin-and-round tube heat exchanger under frost condition**

### **ABSTRACT**

Three-dimensional numerical simulations are carried out to investigate the amount of heat transfer of a plain fin-and-four staggered layout and round tube rows for different fin pitch namely 25.4, 12.7, 6.35 and 4.23 mm. The simulations were conducted for two different frost thermal conductivity of 0.1 and 0.3 W/m-K using FLUENT 6.3 CFD code. The amount of heat transfer of the plain fin-and-round tube heat exchanger under frost condition (0, 1, 2, and 3 mm frost thickness) was investigated. Fluid flow and heat transfer are simulated and results calculated using two turbulence models (k-epsilon, and Transitional SST k-omega), with steady-state solver. Model validation was carried out by comparing the pressure drop of simulated case to experimental results from the literature. Reasonable agreement was found between the present simulations compared to existing numerical study and experimental data.

**Keyword:** Fin tube heat exchanger; Numerical simulation; Frost