

Flow Through Offset Fin

(Characterisation of Offset Fin in Term of Friction Factor)

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Abstract

This case study demonstrates the flow behaviour through offset fin and characterisation in term of friction factor. Offset fin is most commonly used fin in compact heat exchangers for aerospace applications. Offset strip fin has much more importance over other fins due to its thermo hydraulic performance. In present case study, flow through offset fin is considered as steady, laminar and turbulent flow. The K- ϵ turbulent model is used for turbulent region. Simulation is carried out with different fluids, i.e. water and aviation fuel (Jet A1) using OpenFoam Version-7. Pressure gradient across Offset Fin is obtained and further friction factor is calculated for laminar and turbulent region.

Problem Statement

Various Auxiliary systems in aircraft releases heat on main system during operation which may lead to performance degradation or failure. Heat exchanger plays major role in removal of heat. Hence design of efficient Fin used in Heat exchangers are very essential. In this case study a portion of Offset fin is considered to avoid simulation cost and time. To simulate whole heat exchanger, periodic and symmetry boundary is applied on inlet/outlet and side walls respectively. Pressure gradient across fin is obtained for laminar and turbulent region using simpleFoam solver.

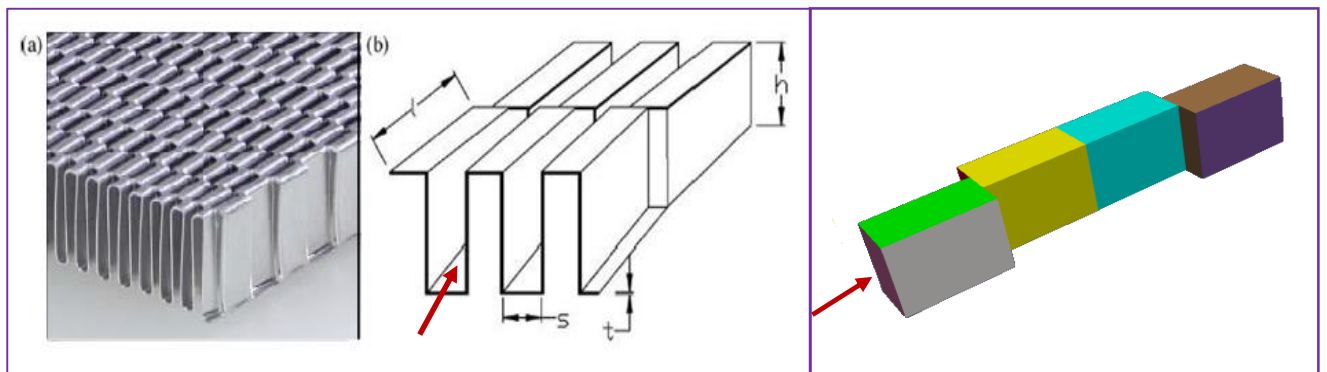


Figure 1: Schematic of Offset Fin and Flow Domain