FOSSEE Summer Fellowship 2026

Jet Chamber Inserts in Mini-Tube Heat Exchangers using Conjugate Heat Transfer (CHT)

V.V.M Sai Nandan[1] **Pranay Pandey**[2] **Manimaran R**[3]

[1]*B.Tech, Department of Mechanical Engineering, IIT (ISM) Dhanbad*
[2]*Research Assistant, FOSSEE, IIT Bombay*
[3]*Professor, Department of Mechanical Engineering, VIT Chennai*

July 18, 2026

Synopsis

This project aims to migrate the study by *M.N. Akram et al.*, which used the convective heat transfer to analyze the influence of different lengths of jet chamber inserts on the heat transfer performance of a single mini-tube heat exchanger, in OpenFOAM. This project uses the conjugate heat transfer method to simulate and analyze the results. The simulations are performed in the laminar regime at Reynolds numbers 200, 400, and so on up to 1200, using the steady-state solver *chtMultiRegionSimpleFoam*.
The principal objectives are to understand the differences in the implementation of conjugate heat transfer from convective heat transfer and evaluates the influence of varying jet chamber length on the thermal performance of the mini-tube heat exchanger. The study also compares the obtained results with the reference results and verifies it.
Results are post-processed using both built-in OpenFOAM function objects and ParaView and python script.

References

[1] Akram et al., "Numerical and experimental study of jet chamber designs for enhancing convective heat transfer in mini-tube heat exchangers," *Case Studies in Thermal Engineering*, vol. 78, Art. 107702, 2026.