Review of: "Numerical Study of Thermal Performance on Fin and Tube Heat Exchanger with Flat Rectangular and Sinusoidal Winglet Vortex Generators"

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Potential competing interests: No potential competing interests to declare.

This research focuses on reducing air-side thermal resistance and evaluates the impact of these vortex generators on flow structure, temperature distribution, pressure distribution, friction factor, and overall thermal enhancement.

Key findings indicate that both types of vortex generators significantly improve heat transfer compared to the baseline configuration. The sinusoidal winglet, in particular, exhibits a higher Nusselt number, indicating superior heat transfer performance. However, this enhancement comes with increased pressure loss, highlighting a trade-off between thermal efficiency and pressure drop.

The study uses the K-epsilon turbulence model to capture flow separation effects and conducts simulations across a range of Reynolds numbers (400-1100). Results show that as the Reynolds number increases, both Nusselt number and pressure loss also increase, with the sinusoidal vortex generator showing better thermal performance but higher pressure penalties compared to the rectangular vortex generator.

This research provides valuable insights for the design and optimization of heat exchangers, particularly in applications where enhanced thermal performance is crucial despite the associated increase in pressure loss. The detailed numerical analysis and comparison of different vortex generator configurations offers a robust foundation for future experimental and computational studies in this field.