

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.

The paper touches upon an interesting and important case and introduces new features that could have an impact on the design of heat exchangers. However, some remarks seem to be in order.

Several phrasing, grammar, spelling, and punctuation errors should be corrected. Perhaps the authors could profit from a professional translation service to improve their paper. Secondly, a number of technical issues must be addressed. In my opinion, the analysis falls short of what can be expected from a research article. Some parts of the analysis are lacking in clarity and detail. The context and importance of the problem could also be set on a firmer footing.

Main remarks:

A fuller description of the relevant technical procedures should be included in a paper that essentially focuses on numerical simulations. Important modelling assumptions and limitations are not really discussed (e.g., discretization scheme, control parameters, mesh characteristics, model limitations, convergence tests, mesh independence tests, etc.). The real problem, however, is the lack of a proper validation. This shortcoming should be addressed without delay.

Some additional remarks:

- Tables for the nomenclature and the values of the geometrical properties would be nice additions.
- The equations are not actually “demonstrated”, are they? These derivations should be referenced in case they were obtained from another source.
- How were the constants on page 5 obtained?
- Were all tubes kept at the same temperature of 350 K? Would this be a reasonable assumption for the tubes downstream?
- The authors seem to jump into conclusions about the heat transfer process based solely on the characteristics of the velocity field. Sound arguments concerning the development of the temperature field should be presented.
- It is claimed that the “sinusoidal vortex generator provides augment heat transfer rate with less pressure penalty”. Why are the sinusoidal shaped fins thermally and hydrodynamically more efficient than the rectangular fins? Please, discuss these aspects in more detail.
- Regarding the comment “In this study, the K-epsilon viscous model was selected because of its ability to capture the separation of the boundary layer near the wall when compared to other viscous models stated in the literature survey”.

Which models were compared and which references were consulted? What is the rational basis for model selection?

- The discussion about flow separation and recirculation around the tubes is based on the description of the local flow field. However, under what global conditions would such circulations form in front of the tubes and, moreover, what are the implications regarding the heat transfer process? Similar considerations should be brought to bear regarding flow separation and wake formation.
- On page 10 one reads “The results are in concurrence with the temperature distribution”, but no plots of the temperature distribution are provided. Note that the temperature field is an essential part of the heat transfer process and, therefore, it cannot be simply overlooked.