

PhD thesis review

Title: Enhancing solar thermal collector performance: experimental and design optimization embedded with turbulator and sustainable insulating materials

Reviewer: Dr. Ravinder Kumar Sahdev

The author works on the experimental and design optimization of solar thermal collector by using the delta shaped (perforated and non-perforated) winglet for enhancing heat transfer rate and ecofriendly insulating materials that work as heat storage materials. The work is very interesting and useful as per the scientific point of view. The author also published their experimental data in various reputed International journal that justify their work.

Introduction:

In the introduction part the author provides the brief research content and motivation behind this study. The author provides the comprehensive details on the various types of solar thermal collector, their advancement and efficiency. The author also provides the brief study of ecofriendly insulation materials and their advantage for the environment. The research work also provides the utilization of delta-shaped obstacle in solar thermal collector for enhancing heat transfer rate.

Literature:

In the literature review section of thesis titled "Enhancing solar thermal collector performance: experimental and design optimization embedded with turbulator and sustainable insulating materials," the author have conducted a thorough and commendable examination of existing research in the field. The comprehensive review provides valuable insights into the various strategies and techniques employed to enhance the performance of solar thermal collectors, particularly through the incorporation of turbulator elements and sustainable insulating materials. By synthesizing and critically analysing prior studies, the author has effectively positioned research within the broader context of solar thermal collector optimization. This



meticulous review not only demonstrates understanding of the subject matter but also highlights the gaps and opportunities for further exploration in your own experimental and design optimization endeavors. Overall, the literature review serves as a strong foundation for the subsequent chapters of the thesis, laying the groundwork for your original contributions to the field.

Methodology:

In the methodology section of the thesis titled "Enhancing solar thermal collector performance: experimental and design optimization embedded with turbulator and sustainable insulating materials," the approach taken to investigate the research objectives is methodically outlined. The systematic description of the experimental setup, including the incorporation of turbulator elements and sustainable insulating materials, reflects a meticulous planning process. The clarity and detail provided in explaining the procedures for data collection, analysis, and evaluation enhance the credibility and reproducibility of the research. Furthermore, the rationale behind the chosen methodologies is clearly articulated, demonstrating a thoughtful consideration of how each step contributes to achieving the research goals. Overall, the methodology section demonstrates a rigorous and well-structured approach to conducting the experimental and design optimization processes, setting a strong foundation for the subsequent stages of the study.

Results and Discussion:

In the results and discussion section of the thesis titled "Enhancing solar thermal collector performance: experimental and design optimization embedded with turbulator and sustainable insulating materials," the findings from the experimental investigations are presented and interpreted in a clear and insightful manner. Through detailed analysis and comparison, the results are effectively contextualized within the broader objectives of the research. The discussion goes beyond merely presenting the data, delving into the underlying mechanisms

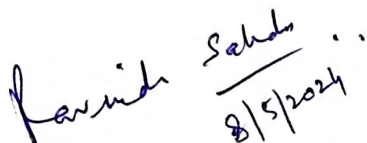


and implications of the observed outcomes. The incorporation of visual aids, such as graphs and tables, enhances the clarity and accessibility of the findings. Furthermore, the discussion acknowledges any limitations or uncertainties in the results, providing a balanced and nuanced interpretation. The author used the optimization MCDM tool to validated their results with experimental outcomes. The research confirms the effectiveness of the ARAS technique by comparing its ranking outcomes with those of alternative MCDM models like TOPSIS, AHP-ARAS, VIKOR, and COPRAS. For the heat storage system, the author works on ecofriendly insulating materials such as coco-peat, stubble fibre and rice husk in order to provide the minimum heat losses from the system. Overall, this section demonstrates a deep understanding of the experimental findings and their significance in advancing the understanding of solar thermal collector performance optimization.

Conclusion

The author justified their experimental results through publication. The author have published their data in reputable journals such as the Journal of Energy Storage, Energy, Sustainable Energy Technologies and Assessments, Heliyon, Results in Engineering, and the Journal of Thermal Analysis and Calorimetry. Now, I am fully satisfied with the work of **Rohit Khargotra** and I am pleased to announce that he can proceed with his final PhD viva voce as soon as possible.

Date: 08.05.2024


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