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Editorial: Thermal Systems Modeling by Using Machine Learning Methods

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Editorial on the Research Topic

Thermal Systems Modeling by Using Machine Learning Methods

Thermal devices are applicable for thermal management of technologies and transfer heat from a high temperature source to a low temperature sink. Regarding the difficulties, such as time-consuming and costly procedures, of experimental works for evaluation of thermal systems, it would be beneficial to propose a model for this purpose. Machine learning methods including artificial neural networks and support vector machines are powerful tools for precise modeling of complex systems. In this regard, these methods have been broadly employed for modeling different thermal systems such as heat exchangers, heat pipes, solar collectors, and thermophysical properties of heat transfer fluid, etc. In order to develop their applications and improve their accuracy, several modifications have been performed on these approaches by scholars and researchers. The aim of the present research topic was gathering novel research that applied machine learning approaches for modeling thermal systems. In this regard, the researchers were invited to submit their articles to this topic for evaluation and possible publication. Among the submitted manuscripts, four of them were accepted for publication in Frontiers in Energy Research.

In the first accepted paper, entitled "*Economic benefit evaluation system of green building energy saving building technology based on entropy weight method*," the entropy weight method in addition to the analytical hierarchy process (AHP) was used to correlate between building technology and economic effect. In order to reach this goal, 6 first level indexes of evaluation in addition to 20 s level indexes of evaluation and two indexes of evaluation of incremental economic effect ration and incremental payback period were used and considered. In the second paper, entitled Shahrestani et al. computational fluid dynamics (CFD) was applied to numerically investigate the performance of the heat exchanger when using nanofluid and an orthogonal rib turbulator. Afterwards, based on the findings of CFD, a curve fitting tool was employed to propose a correlation to determine the convective heat transfer coefficient and pumping power. In the third accepted article, entitled Mokhtari et al. an artificial neural network was applied to investigate the impact of cloud cover on the potential of radiative cooling. It was found that applying the proposed model on the basis of the artificial neural network provides an accurate prediction for temperature of the radiative cooling system. Finally, in the fourth accepted paper, entitled Alotaibi et al. a machine learning method known as random forest was used to forecast the lowest film boiling temperature for quenching vertical rods in water. The results of this study reveal that by using the

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proposed method the prediction can be done with higher accuracy compared with the previous models.

To sum up, on the basis of the findings of the accepted papers in this research topic it can be noted that machine learning approaches can be developed for various thermal systems in order to predict their performance and model their behavior with relatively high accuracy.

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AM and MAN have written the text and designed the article. WZ and MSS have rechecked and edited the manuscript.

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