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The use of machine learning in optimizing the height of triangular obstacles in the mixed convection flow of two-phase MHD nanofluids inside a rectangular cavity

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Abstract

In this article, a numerical study was conducted on the mixed convection (CNV) of nanofluid (NFD) in a two-dimensional rectangular cavity using the control volume method. The upper and lower walls of the cavity were cold and hot, respectively, and its two vertical walls were insulated. The Upper wall has constant velocity and order to create a forced CNV in the cavity. They positioned three triangle-shaped obstacles on the heated wall that were likewise hot. The velocity and temperature graph values in the cavity, the velocity and streamline contours, and the Nusselt number value were examined independently by varying the height (HIT) of each barrier. Using artificial intelligence, the best values of the parameters to have the strongest flow and the most heat transfer (HTF) were checked. Two-phase method was used to simulate NFD flow. The results of this study showed that the middle obstacle with the highest HIT had more HTF. Increasing the length of the obstacle on the right has reduced the amount of HTF and the highest HTF occurred at the lowest HIT of this obstacle. When the obstacle on the left side has the HIT, the amount of HTF is the highest, while its average value has minimized the HTF. An increase in the HIT of the right fin at different HITs of the other two fins reduces the average Nu value