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Artificial Neural Network for the prediction of heat transfer of mixed convection in lid-driven cavity with double vertical or horizontal blocks.[1] ABDELKADER FILALI, OMAR K. MATAR, Department of Chemical Engineering, Imperial College London, South Kensington Campus, London SW7 2AZ, UK, LYES KHEZZAR, Khalifa University of Science and Technology, Department of Mechanical Engineering, Abu Dhabi, UAE, HAMZA SEMMARI, Ecole Nationale Polytechnique de Constantine, BP 75, A, 25000 Nouvelle ville RP, Algeria — The capability of using Artificial Neural Network (ANN) to predict Nusselt number for laminar mixed convection, is established. Numerical simulations are carried out in lid-driven square cavity with two internal rectangular blocks, positioned in vertical or horizontal direction. The objective is to predict the optimum distance between the two rectangular blocks W/L that provides the maximum heat transfer coefficient. CFD results are used for training and testing the ANN to predict new cases; thus, saving effort and computation time and validate the obtained numerical results. A wide range of flow and heat transfer parameters are considered. The maximum Nu number obtained for the vertical blocks was at W/L = 0.4 (Re = 500 and Gr = 5 10^4) and for the horizontal blocks case was at W/L = 0.3 (Re = 500 and Gr = 5 10^4). These numerical results agree well with the ANN predictions; thus, the ANN may help reduce analysis-time and effort.

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