|  |  |  |  |
| --- | --- | --- | --- |
| Title | On the applications of neural network technique for electro-viscoplastic Casson hybrid ferrofluid with a permeable channel | | |
| Author(s) Name | MMH Imran, Muhammad Sajjad Hossain, MM Billah, Humaira Farzana | | |
| Contact Email(s) | imran.math@aiub.edu | | |
| Published Journal Name | International Journal of Thermofluids | | |
| Type of Publication | Journal | | |
| Volume | 24 | Issue | 1 |
| Publisher | Elsevier | | |
| Publication Date | 01-11-2024 | | |
| ISSN | 2666-2017 | | |
| DOI | <https://doi.org/10.1016/j.ijft.2024.100976> | | |
| URL | <https://www.sciencedirect.com/science/article/pii/S2666202724004166?ref=pdf_download&fr=RR-2&rr=91865ed8cf36b24c> | | |
| Other Related Info. |  | | |
|  | | | |

|  |  |
| --- | --- |
| Abstract |  |
| The flow of a hybrid ferrofluid (*Fe*3*O*4 − *CoFe*2*O*4) /*H*2*O* in the presence of magnetic field in a rectangular domain between two permeable channels has been studied considering the flow is unsteady, viscous, irrotational. The model's applicability in both industrial and medicinal settings make this work advantageous. Thermal buoyancy and heat sources/sinks over the flow have also been considered in this work. The hybrid nanoliquids can easily escape, squeeze, and dilate through the permeable channel. A mathematical framework has been developed to examine and demonstrate the solutions both numerically and graphically, considering the variations of physical parameters inside the flow geometry. The controlling PDEs are transformed into ODEs using similarity transformations and then solved using Newtonian shooting technique. Furthermore, ANN model with Levenberg- Marquardt back propagation technique is applied for the prediction of Nusselt number and pressure gradient. For this, a data set is generated from the numerical method to perform training, testing and validation. The MATLAB software has been used for overall computation. Mean square error (MSE), regression values, and error histograms are used to compare predicted data correctness. This ANN trained model is used for predicting non-dimensional quantities via the heat transfer rate, skin friction coefficient, and pressure distribution. | |