



Numerical Heat Transfer, Part A: Applications >

An International Journal of Computation and Methodology

Volume 74, 2018 - [Issue 4](#)

536 | 63

Views | CrossRef citations to date | 0 | Altmetric

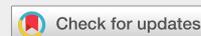
Articles

Development of multilayer perceptron artificial neural network (MLP-ANN) and least square support vector machine (LSSVM) models to predict Nusselt number and pressure drop of TiO₂/water nanofluid flows through non-straight pathways

Mostafa Kahani, Mohammad Hossein Ahmadi , Afshin Tatar & Milad Sadeghzadeh

Pages 1190-1206 | Received 01 May 2018, Accepted 27 Aug 2017, Published online: 17 Oct 2018

 Cite this article <https://doi.org/10.1080/10407782.2018.1523597>



Sample our
Engineering & Technology
Journals

>> [Sign in here](#) to start your access
to the latest two volumes for 14 days

 Full Article

 Figures & data

 References

 Citations

 Metrics

 Reprints & Permissions

[Read this article](#)

[Share](#)

Abstract

In this study, Multilayer Perceptron Artificial Neural Network (MLP-ANN) model and Least Square Support Vector Machine (LSSVM), were developed to predict the thermal performance and pressure loss of nanofluid flow through coils as non-straight pathways. There different coils with various curvature ratios and coil pitches were constructed and used. Stable TiO₂ (50 nm)/water nanofluid in different concentrations from 0.0 to 2.0% were prepared using appropriate method. As it is expected, considerable enhancement

of heat transfer was achieved by application of nanofluids instead of water in system. Volume concentration of nanofluid, Prandtl number (ranging from 4.82 to 9.11) and Helical number (106.80 to 1282.87) were introduced to the developed models to obtain Nusselt number (9.89 to 53.30) and pressure drop (291.35 to 18784 kPa) as the output data of the models. According to the output results of developed models, MLP-ANN model was able to predict both Nusselt number and pressure drop of nanofluid flow more precisely in comparison to LSSVM model. The developed MLP model of this study exceeded LSSVM model to high correlation coefficient value of 0.97.

Related research

People also read

Recommended articles

Cited by
63

[Applicability of connectionist methods to predict dynamic viscosity of silver/water nanofluid by using ANN-MLP, MARS and MPR algorithms >](#)

Mohammad Hossein Ahmadi et al.
Engineering Applications of Computational Fluid Mechanics
Published online: 5 Mar 2019



Information for

[Authors](#)

[R&D professionals](#)

[Editors](#)

[Librarians](#)

[Societies](#)

Opportunities

[Reprints and e-prints](#)

[Advertising solutions](#)

[Accelerated publication](#)

[Corporate access solutions](#)

Open access

[Overview](#)

[Open journals](#)

[Open Select](#)

[Dove Medical Press](#)

[F1000Research](#)

Help and information

[Help and contact](#)

[Newsroom](#)

[All journals](#)

[Books](#)

Keep up to date

Register to receive personalised research and resources by email



Sign me up



Copyright © 2026 Informa UK Limited [Privacy policy](#)

[Cookies](#) [Terms & conditions](#) [Accessibility](#)

Registered in England & Wales No. 01072954
5 Howick Place | London | SW1P 1WG

 Taylor and Francis
Group