عنوان مقاله:

Artificial Neural Network Application for Aerodynamics of an Airfoil Equipped with Plasma Actuators

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خلاصه مقاله:

Prediction of the aerodynamic forces acting on a NACA ۲۴۱۵ airfoil equipped with plasma actuators is carried out by using artificial neural network. The data sets for ANN model include the experiments which are plasma actuator positions for effective flow control, different Reynolds numbers and various attack angles. Mean absolute percentage and mean squared errors are calculated to assess the performance of the training and the testing stages of ANN model in prediction of drag and lift coefficients. The maximum error for lift and drag estimation are ۱۲.۸۴% and ۲۳.۷۰۵%, respectively. Also, as a part of the presented study, the process parameters affecting the performance of the plasma actuators in active flow control around a NACA ۲۴۱۵ airfoil is presented in detail. The well-matched results of the ANN based estimations of the ANN indicates that there is almost no need for dealing with complex experimental studies to determine the aerodynamic performance of the NACA۲۴۱۵ airfoil, hence providing the advantage of saving time and cost. Furthermore, the experimental results along with the ability of ANN to estimate aerodynamic performance parameters provide a good database in the active flow control related research field.

کلمات کلیدی:

Airfoil, Artificial neural networks, Flow control, Plasma Actuator

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