

ABSTRACT

USING AN ARTIFICIAL NEURAL NETWORK TO PREDICT FLIGHT LOADS FOR MANEUVER ENVELOPE EXPANSION OF A MODERN AIRCRAFT

An artificial neural network model was created in MATLAB's Artificial Neural Network Toolbox to predict airframe maneuver loads during flight envelope expansion testing. The multilayer feedforward artificial neural network model was trained with back-propagation to predict a maneuver load in an envelope expansion sequence. Compared to regression analysis, in most cases, the artificial neural network analysis predicted the next envelope expansion sequence flight load with greater accuracy. Additionally, in all cases, the artificial neural network was able to fit the training data used to make the extrapolation with greater accuracy. The artificial neural network model was also used to accurately survey a flight envelope between flight test points. An artificial neural network can be used to accurately model flight loads for maneuver envelope expansion and aid in the management of technical, programmatic, and safety risk.

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