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Book of Abstracts

Edited by
Željko Božić, Željko Domazet, Robert Basan, Milan Vrdoljak and Marijan Andrić

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Prof. Dr. Željko Božić
University of Zagreb
Faculty of Mechanical Engineering and Naval Architecture
Department of Aeronautical Engineering
Ivana Lučića 5, HR–10002 Zagreb, Croatia
e-mail: `zeljko.bozic@fsb.unizg.hr`

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A NEW ARTIFICIAL NEURAL NETWORK MODEL FOR PREDICTING FATIGUE LIMIT AND FRACTURE TOUGHNESS VALUES OF SOME STAINLESS STEELS

Dj. Ivković[1], D. Arsić[1]*, D. Adamović[1], A. Sedmak[2], V. Mandić[1], M. Delić[1], A. Mitrović[1]
[1]*Faculty of Engineering, University of Kragujevac, Sestre Janjić 6, 34000, Kragujevac, Serbia*
[2]*Faculty of Mechanical Engineering, University of Belgrade, Kraljice Marije 16, 11000, Belgrade, Serbia*
*correspondence to: dusan.arsic@fink.rs

The aim of this paper is to present the possibility of the application of Artificial Intelligence for determining fracture toughness and fatigue limit values of some grades of stainless steel. Experimental procedures for both, fracture toughness and fatigue limit determination are time-consuming, thus the application of artificial intelligence instead of long, time-exhausting experiments could result in less time spent waiting on experimental results as well as less resources that need to be provided.
For this purpose, two Artificial Neural Networks (ANN) with same architecture (Fig. 1) were created and applied. The above mentioned properties are determined for the austenitic stainless steel X5CrNiMo17-12-2 and X6Cr17 ferritic stainless steels. Complete work regarding ANN was conducted in Mathworks MATLAB 2017 software using nntool module. After completing training of ANN when adequate regression levels were reached, simulations were conducted using chemical composition of X5CrNiMo17-12-2 and X6Cr17 steels. Obtained results are displayed in Fig. 2 and were compared with existing data. Conclusion that was drawn is that ANN that predicts KIC values has greater precision than ANN for fatigue limit. Potential reason for that could be that input layer needs more input data to increase precision.
Key words: artificial intelligence, artificial neural networks, stainless steels, fracture toughness, fatigue limit

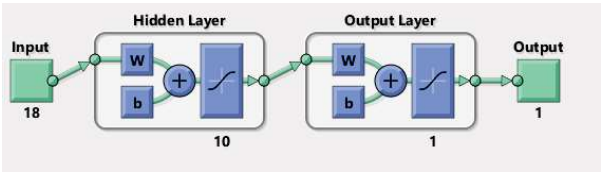
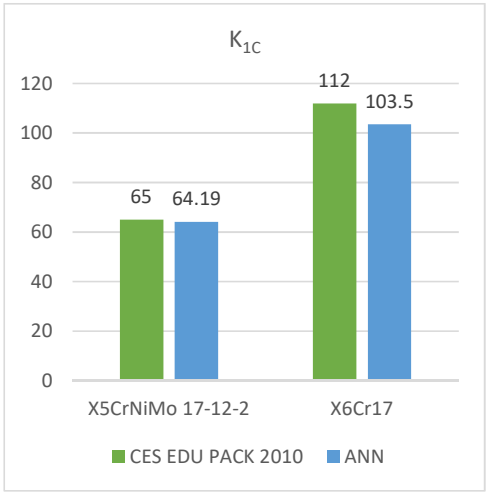
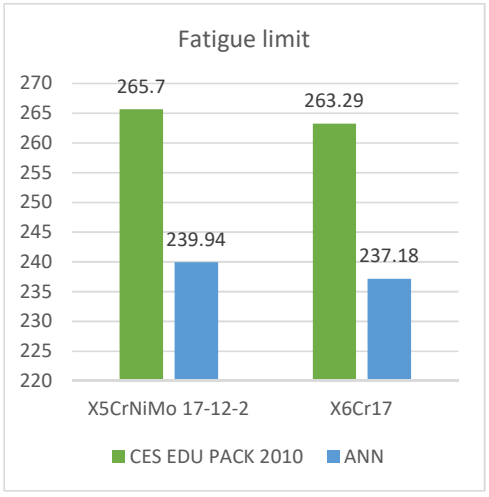


Fig. 1. Architecture of ANN's used for predicting data



a)



b)

Fig. 2. Comparison between available and predicted data