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Forecasting of Selected Mechanical Properties of Hybrid Composites

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Extended Abstract

A wide range of research in the context of newly designed materials results from taking into account the conditions in which the component made of this material works [1, 2, 3]. These include tests carried out at various temperatures or changing disturbing factors that may cause local or complete damage. Optimization of the composition of such materials based on their properties, which is the basis for making decisions about the possibility of using them in a given solution, also becomes the key.

Among the construction materials, polymer composites are increasingly widely used. By using various materials such as reinforcement, there is unlimited possibility to modify their properties [4]. This influences the dynamics of the increase in interest in these materials observed in global industry trends. Research carried out in the field of developing high-strength and highly-modular constructions while reducing the specific gravity of composites, opens the perspective of increasingly bolder use of them in the construction, automotive and aerospace industries (which, according to research, will record an above average increase in the use of composite materials in 2019-2024 in relation to previous years) [5,6].

Experimental determination of the properties of polymer composites can be a valuable source of information about the behaviour of a given material, and the use of modern information technologies, such as artificial neural networks, gives the possibility of forecasting its properties while reducing the number of observations carried, bringing both economic and environmental benefits.

In this paper we apply the Artificial Neural Network (ANN) as a model which provides the view on the influence of the introduced a share modifier on selected mechanical properties as well the formation of abrasive wear of polymer composites used in aviation industry. Created models in the form of (ANN) allows to obtain expected properties of composite materials which are resistant to the introduced of incorrect input data.

Keywords: neural networks, modelling, composites, machine learning

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