DETERMINATION OF THE RHEOLOGICAL PARAMETERS OF THE MATERIAL BY AN IMPROVED METHOD ON THE EXAMPLE OF THE CREEP PROCESS UNDER TORSIONAL DEFORMATION

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Abstract - In this work, we discuss an improved methodology for determining the parameters of rheological functions in materials with elastic-plastic properties, using the creep process under torsional deformation as an example. This approach is based on the theory of inheritance, where the parameters of the rheological functions (A, α, and β) are determined by combining graphs. Traditionally, these graphs are matched through visual alignment of manually drawn curves, which is prone to significant human error. The updated methodology presented in this work involves the precise matching of graphs using various computer programs, with their alignment performed using a least-squares approach.

During the research process, we utilized an existing database of theoretical graphs of rheological functions and values displayed in tabular form, which, although important, contains insufficient information. To expand this database, specific programs were developed using "Maple," and a methodology was created for the simplified calculation of complex mathematical expressions through numerical methods by transitioning to the complex plane.

Based on experimental data from the torsional testing of composite materials, the improved matching method was used to calculate correction coefficients that determine the accuracy of graph alignment, and the percentage differences were estimated.

Keywords - Composite Material, Rheology, Creep, Influence Function, Torsional Deformation.