Calculation of the Dynamics of Structural Transformations During the Thermal Transformation of Composite Materials and Coatings

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A composite material is a material consisting of two or more components (reinforcing elements and a matrix holding them together) and having properties that are different from the total properties of the components.

Composites include materials that have a number of characteristics:

- the composition, shape and distribution of the material components are "designed in advance";
- the material does not occur in nature, but is created by man;
- the material consists of two or more components that differ in chemical composition and are separated by a pronounced boundary;
- the properties of the material are determined by each of its components, which in this regard must be present in sufficiently large quantities (more than some critical content);
- the material has such properties that its components, taken separately, do not have;
- the material is inhomogeneous at the micro-scale and homogeneous at the macro-scale. (According to K. I. Portnoy et al., the sixth feature does not allow to attribute bimetals and materials with coatings to CM, since they are not homogeneous at the macroscale)

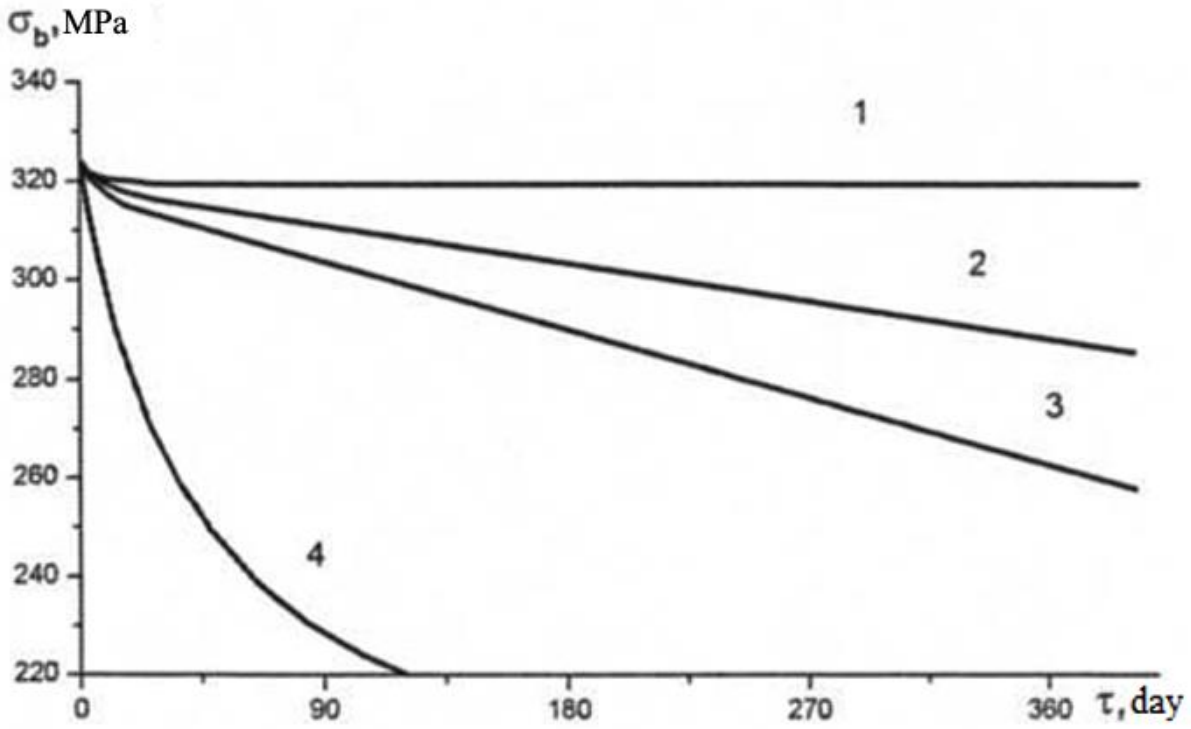

Fig. 1. The dependence of the maximum tensile stress σ of CAST-B fiberglass from the duration of aging in the open air and the operating voltage [43]: *1* – 0; *2* – 17 MPa; *3-50* MPa; 4-91 MPa.

Composite materials are divided into:

- polymer (PCM),
- metal (MCM),
- ceramic (CCM),
- carbon-carbon (CCCM)
- hybrid (HCM). (Hybrid composites are materials with a mixed-type matrix)

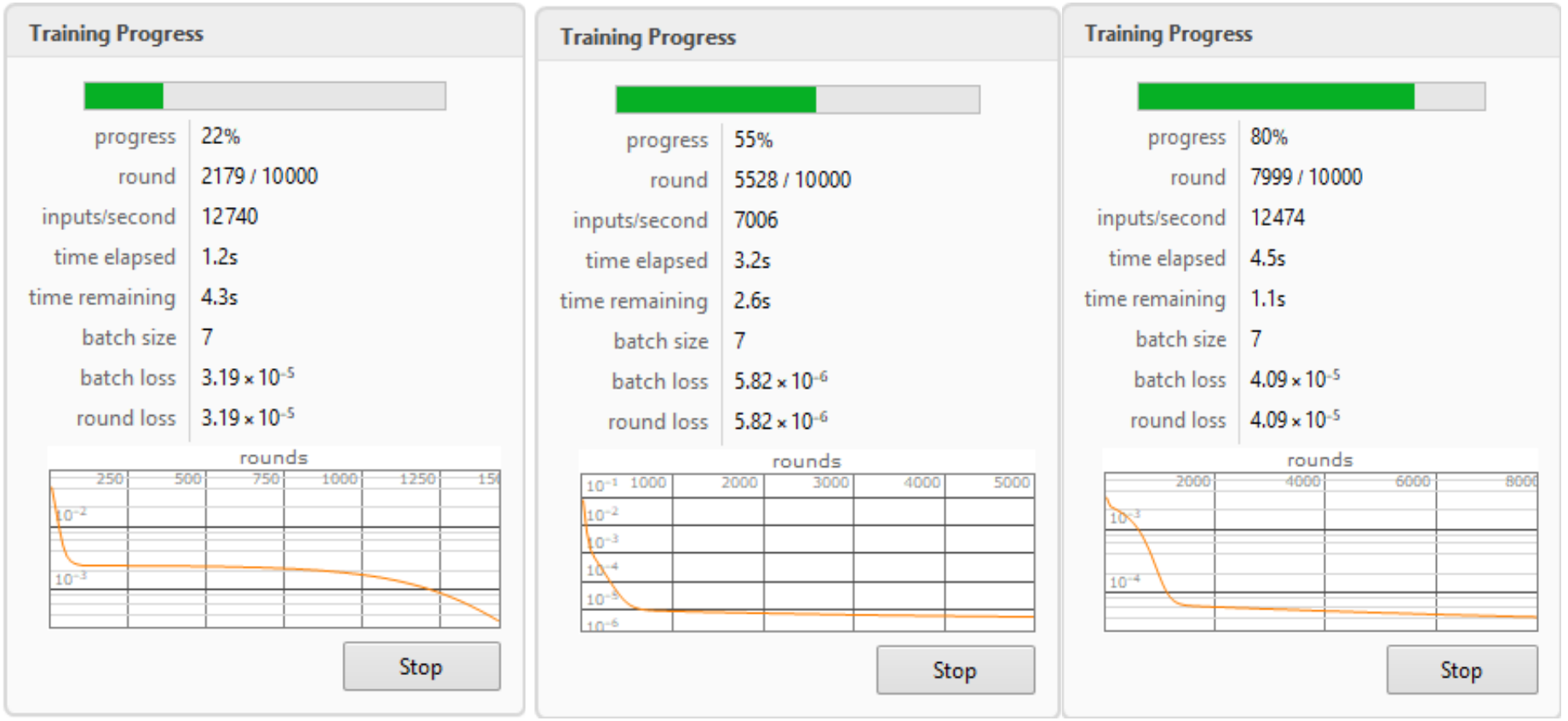

Fig. 2. Dynamics of training of a neural network with 10 neurons on a hidden layer.

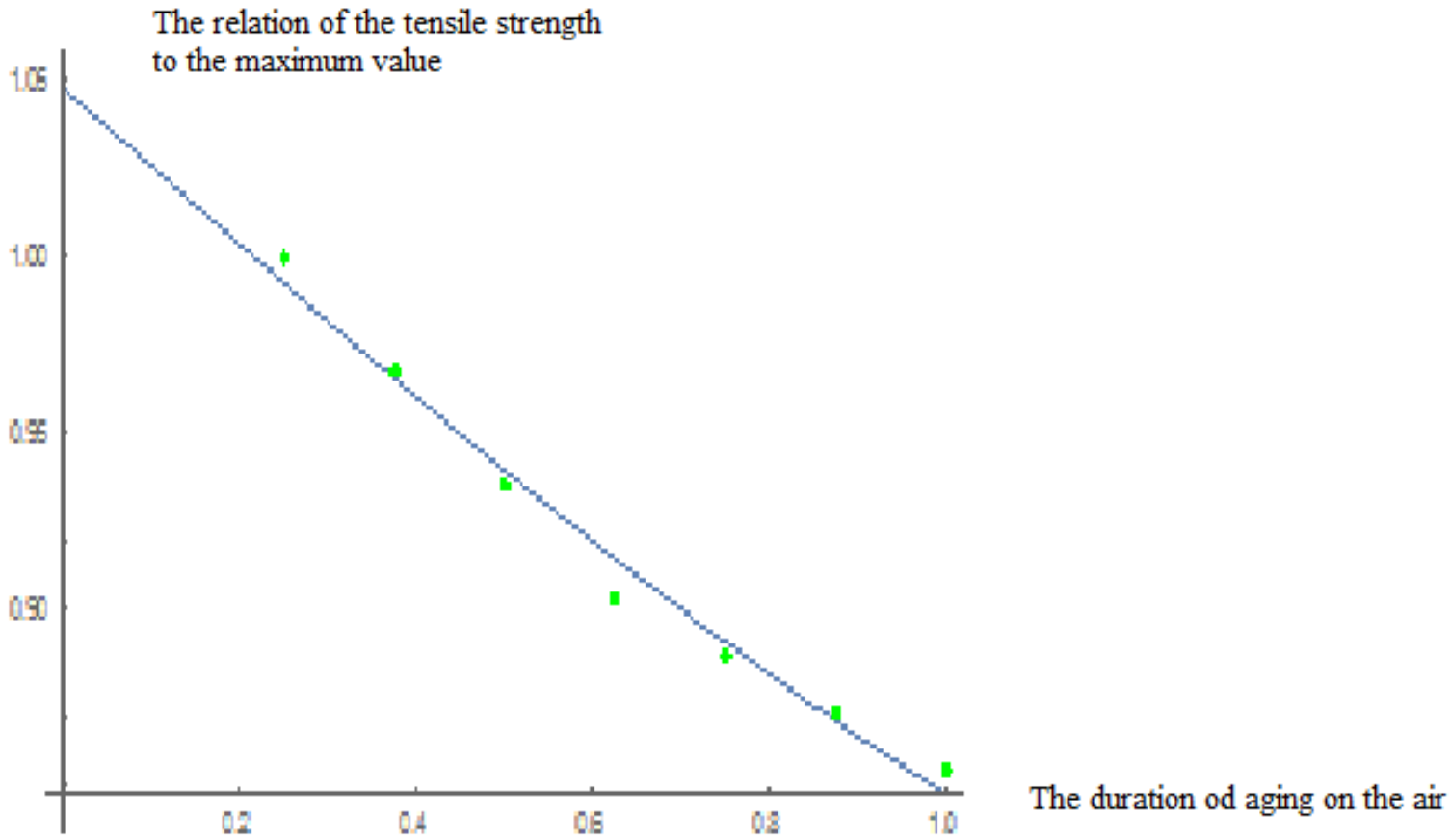

Fig. 3. Training result.

Thank you!

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