High-resolution ultrasound visualization of micromechanical behavior of polymer materials with thin-fiber microstructure

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Abstract.
We present the novel experimental equipment for solutions to a fundamental problem in the field of micromechanical behavior of opaque materials with thin-fiber microstructure under mechanical loads. It is a real-time high-resolution ultrasound observation of microstructure changes in the volume of materials under tension. Here, the results of the study of micromechanical behavior of two types of materials with thin-fiber microstructure, namely: nonwoven materials for biomedical application and carbon fiber reinforced composites for aerospace engineering, are presented. Ultrasound visualization was carried out with a controlled stepwise increase in the deformation of the loaded specimens. This approach makes it possible to visualize in dynamics the processes of appearance, growth and transformation of microstructural damages in the volume of materials, with a resolution of several microns.
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