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PHYSICAL-MECHANICAL PROPERTIES OF A FIBER-REINFORCED COMPOSITE BASED ON AN ELUR-P CARBON TAPE AND XT-118 BINDER

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A series of tests to identify the physical-mechanical properties of a unidirectional carbon-fiber-reinforced composite based on an ELUR-P carbon fibers and an XT-118 epoxy binder were performed. The form of the stress–strain diagrams of specimens loaded in tension in the longitudinal, transverse, and ±45° directions and in compression in the longitudinal and ±45° directions were examined. Tensile diagrams were also determined for the XT-118 binder alone. The relation between the tangential shear modulus and shear strains of the composite was highly nonlinear from the very beginning of loading and depended on the loading type. Such a nonlinear response of the carbon-fiber-reinforced composite in shear cannot be the result of plastic deformation of binder, but can be explained only by structural changes caused by the inner buckling instability of the composite at micro- and mesolevels..

Statement of the Problem

The shear modulus of a fibrous composite material is one of its most important mechanical characteristics. It is known (see, for example, [1-3]) that, in compression of such a composite by a stress applied along the reinforcing fibers, the critical value of stress corresponding to failure turns out to be equal to the transverse shear modulus because of real-

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