

Dynamical Young's Modulus and Internal Friction in Ultra-High Molecular Weight Polyethylene Composites

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Abstract. This work is devoted to the acoustic spectroscopy investigation of self-reinforced ultra-high molecular weight polyethylene composites made of pressed unidirectional sheets stacked orthogonally to each other. The studied samples demonstrate excellent mechanical properties in a wide temperature range from $-5\text{ }^{\circ}\text{C}$ to $50\text{ }^{\circ}\text{C}$. The relative change in the modulus of longitudinal elasticity for all samples in the studied temperature range did not exceed 1.6%. Depending on pressure value that is used at the stage of fabrication, the studied samples demonstrated dynamic Young's modulus values up to 17.8 GPa and internal friction up to $16 \cdot 10^{-2}$. Quasi-static mechanical properties are measured using the specimens of various shapes by tensile test. The values of Young's modulus, determined in the elastic part of the tension curves, reach 16.9 GPa.

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