

# Fatigue properties of the dynamically damaged carbon laminate

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Standard tests for the estimation of the impact damage do not represent the real conditions of the foreign object damage (FOD) of the outer layer of the composite blade of the aircraft engine. Standard compression after impact test (CAI) involves drop test impact of the relatively thin specimen where bending load component is relatively high. We propose another technique: Specimen is loaded in a modified split Hopkinson bar where loading ends of bars have a spherical shape with curvature radius 16 or 32 mm. This provides controlled compression load which seems more adequate for the estimation of the tensile and fatigue properties of the outer layer of the composite aircraft turbine blade subjected to the impact by the foreign object. Damaged specimen was then tested in the hydraulic testing machine. Strain field evolution and acoustic emission during the tests were recorded. Results were compared with tests of specimen with the hole at the center. We suppose that due to more localized damage area it is possible to use experimental data of such experiments for the estimation of FOD damage. Additional tests will be performed in the future to estimate equivalent hole diameter to represent FOD damage including structure investigation by microtomography. Work is financially supported by Russian Science Foundation grant No. 21-79-30041.