STRENGTH OF MULTI-HOLLOW CYLINDER WITH STRUCTURAL DEFECTS

Karash E.T., postgraduate, Vereshaka S.M., professor, SumSU, Sumy

The research results [1] indicate that the characteristic damage of laminated composites with longitudinal-transverse and quasi-isotropic stacking layers of the [0, 90] s, [0, 90, ± 45] S under tension is the formation of an array of cracks in the matrix layers, oriented at an angle to the direction of the load. As a rule, the formation of the grid crack occurs before structural failure as a whole. In this case, observed decrease in rigidity of composite material, fiber breaks, initiated by cracks in the matrix, which in turn reduces the load-carrying capacity and service life of structures made of layered materials.

It is known that the strength of reinforced laminates is investigated using two approaches: the structural and phenomenological. As noted in [2], the current state of the structural approach micromechanical theories of strength is that not possible to get reliable quantitative data to assess the strength of the composites. Analysis of these or other limitations strength criteria and a description of the processes of destruction of different composite materials contained in the fundamental papers already noted the concentration of interlaminar normal and shear stresses near the crack at the interface of adjacent layers initiates separation in adjacent areas. Forecasting the start of the bundle is generally carried out by identifying all the components of a three-dimensional stress state in this region of the layered composite and the substitution of the values obtained in the corresponding strength criteria [2, 3].

Thus, the bundle is the most dangerous type of fracture in predicting the bearing capacity of structures made of composite materials. The conditions of the bundle and the associated redistribution of stresses not been adequately studied.

The paper proposed a method for assessing the strength of thin-walled structures made of composite materials which structure is determined by a set of differently oriented unidirectional reinforced layers. The layered hollow cylinder of transversely isotropic material with a given structure reinforcement was considered. It has been shown that the proposed method of calculating the bearing capacity of multilayer structures is satisfactory that's just good agreement with experimental data.

Reference

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3. Tolf G., "Stresses in a Curved Laminated Beam," Fiber Science and Technology, Vol. 19, No. 4, 1983,pp. 243 - 267.