

Report on scientific and scientific-organizational activity of the "Creeping theory" department for 2014

According to the plan for 2014, the "Creeping theory" department has executed scientific works on the theme "Deformation of constructions made of rheonomic materials".

I. Scientific report

Work: a stochastic model of the corrosive failure of bodies.

Executive: doct.ph.m.s. prof. L.Kh.Talybly

The deterministic theory of corrosive failure of bodies worked out by the author is used. The parameter dependent probability density function expressing the loading process is introduced. Each universal function characterizing the body-the characteristic failure time dependent on both universal material constants and the number of periods to failure corresponding to constant stresses difference are determined. The obtained formula is applied to prediction of failure time of concrete structural element under the action of aggressive medium.

Work: Variable thickness stopping the development of the crack.

Executor: Leading research associate, prof. V.M.Mirsalimov

An elastic medium weakened by a variable width slot $h(x)$ comparable with elastic deformations. The compressive stresses area is formed under the action of volumetric forces. This reduces origination of concave zone consists of cohesion area and ellipse parts.

For finding contact stresses the system of singular integral equations is obtained. The exact solution of the problem is obtained by reducing the integral equations to the Riemann problem.

Work: Torsion of truncated conic shaft with regard to corrosive medium

Executor: f.d.e.n., a.e.i. R.A.Kazımova

The problem on failure of truncated conic shaft working for torsion in aggressive medium is solved. In the first step, the problem of elasticity theory is solved: the stress tensor components originating in the shaft under torsion of a truncated conic shaft are determined. For that the mathematical statement of the problem is given and the application method of the airy function is chosen as the solution method. In the second step, the Rabotnov formula enabling to define the time of corrosive failure is used.

Work: Long-term strength of the damaged shaft in torsion.

Executor: cand.ph.m.s. doc. L.r.a. M.A.Mammadova

The problem of initiation and development failure zone of an isotropic and cylindrical anisotropic cylinder in torsion is stated and solved. The formulas of incubation period are derived. Integral equations of the motion of failure boundary are obtained.

Work: Interaction of cohesion cracks in a plane strengthened by ribs.

Executor: cand. ph.m.s. doc. l.r.a. M.V.Mirsalimzade

A thin elastic plane strengthened with stringers is considered. The crack model of bridged crack was used. Physical nature and sizes of these relations depend on the kind of the material. The boundary value problem is reduced to the solution of the non-linear singular integral equation.

Work: Influence of aggressive medium concentration on corrosive failure

Executor: r.a. H.A.Mammadova

A universal function formula of the corrosive strength of materials is given. By means of this function it is possible to predict the properties mechanical stress and concentration of diffused substances in the medium "material- corrosion".

Work: Torsion of a visous elastico plastic ploane with a hole

Executor: P.V.Hasanova

The symmetric hole plane is subjected to stretch. The plane's material is viscous elastico- plastic. The mathematical statement of stress- strain problem is given. By solving the problem the solution of elasticoplastic problem was used.

Work: Corrosive failure of a half-plane with a tangential force on the boundary

Executor: j.r.a. E.T.Bagirov

The half-plane is located in aggressive medium. Aggressive medium and tangential force after certain time reduces to failure of the half-plane. In the considered problem the cracking time of the half-plane is predicted.

Work: Modeling of a viscous elastico-plastic infinite plane with an elliptic hole

Executor: j.r.a. R.G.Alimammadov

Failure of elliptic hole infinite plane made of viscous elastico-plastic material in the deformation process is simulated on the basis of the same model plane.

Work: serviceability of an infinite plane with a hole under the stationary random pressure

Executor: j.r.a. N.M.Nagiyeva

An infinite plane with a hole is subjected to stationary random pressure. The serviceability of this plane under this pressure is determined.

II. Scientific- organizational of activity

The collaborators of the department have published 23 papers and 4 theses, 16 of the papers in foreign journals, 7 in impact factor journals, 5 papers in Thomson Reuters list journal.

The collaborators of the department L.KH.Talybly V.M.Mirsalimov have given talks in the institute seminars. The paper of l.r.a. doc. R.A.Kazimova “Alternative procedure of deducing Rabotnov relations for the time to corrosion fracture of metals” (published in materials science, 2010, vol.40, №2.p.265) was highly evaluated by the Publishing group corporation.

Prof. V.M.Mirsalimov completed his grant work supported by the Science Foundation.

Prof. L.KH.Talybly has taken an active part in the work of Scientific Council of the journals “Proc. Of IMM”, “Trans. of NASA”.

Head of the department doc.ph.m.s. prof. L.KH.Talybly