

Semi-annual report of “Creeping theory” department of IMM

ANAS for 2018

In “Creeping theory” department work 8 collaborators:

1. Talybly Latif Khalil – head of department
2. Kazimova Raisa Abulfaz – leading research associate
3. Mir-Salim-zade Munevver Vagif – leading research associate
4. Mamedova Mehriban Ali – leading research associate
5. Mamedova Hijran Ali – research associate
6. Bagirov Emin Telman – research associate
7. Nagiyeva Nigar Miryashar – research associate
8. Bagirova Sema Asif – senior laboratory assistant

7 of these (seven) are research associates and 1 (one) senior laboratory assistant. According to the research plan of 2018 in the department there are 7 works on the topic "Variable load of bodies of irreversible deformation". The plan provided for the seven works on the subject. Scientific works are carried out according to the plan.

I. Scientific activity

Work: Solution of the problem of Kelvin's boundary-value problems in the theory of viscoelasticity

Executor: doct.ph.math.sci., prof. L.Kh.Talybly

The problem of determining the stress-strain state that occurs in an infinitely large isotropic viscoelastic body under the action of a concentrated force is solved. An exact solution of the problem is obtained.

1. L.Kh.Talybly, N.M.Nagiyeva. On fatigue of materials with regard to incubation period of failure and influence of loading history // Journal of Baku Engineering University – Mechanical and Industrial Engineering, 2017, vol.1, №1, p.21-25

Work: Geometrical nonlinear deformation under the internal stress of an infinite plate with circular hole

Executor: cand.ph.m.s., lead.re.ass. R.A.Kazimova

An infinite plate with a geometrical nonlinear deformation is rounded. The regular spreading stress affects the hole on the plate. Deformation state of tension

on the plate is studied. It is assumed that the nonlinear deformation of the plate is logarithmic. The mathematical formulation of the problem is given, a solution method is suggested. The problem is solved. Special cases of concern are under investigation.

Work: Deformation of a viscoelastic ring with variable boundary under internal stress

Executor: cand.ph.m.s., lead.re.ass. M.A.Mammadova

The problem of deformation of the ring made of viscoelastic material under internal stress is solved. The ring was exposed to stress from the inside, and at the same time the inner radius of the rings grows over time. This can happen, for example, as a result of internal combustion. It is impossible to apply integral transformations into this solution because of variable internal border of the ring. Therefore, new solution method for this problem is chosen. The problem is solved. Special cases of concern are under investigation.

Work: Equal durability hole form for stringer plate with a crack

Executor: cand.ph.m.s., lead.re.ass. M.V.Mirsalimzade

Equal durability hole on the elastically isotropic stringer plate is predicted. First of all, mathematical formulation of the problem is given. The principles of the theory of elasticity (Hooke's law) is used. Stresses and deformations around the crack, are determined. Then, the hole form is determined by using the equal durability condition.

1. Мир-Салим-заде М.В. Частичное закрытие трещин со связями в подкрепленной пластине с отверстием // 19-я Межд. научно-техн. конф. «Актуальные проблемы строительства, строительной индустрии и промышленности», г. Тула, Россия, 28-29 июня 2018.

Work: Torsion of narrow rectangular with a cross-section of prismatic bar in aggressive environment

Executor: res.ass., H.A.Mammadova

The formulation of the problem of determining the time before the corrosive failure in an aggressive medium of the beam, which has a narrow rectangular cross-section, is given. The beam is subjected to strain. The solution of the problem is carried out in two stages. In the first stage, the problem of determining the stresses in the bar is solved in the absence of an aggressive medium. In the second stage, the time is determined before the corrosive destruction of this bar, depending on the characteristics of the corrosive medium, the properties of the material, geometric parameters, etc.

Work: Prediction of the corrosive failure of the infinite plate in contact with the heated aggressive medium

Executor: res.ass., E.T.Bagirov

Aggressive medium affects the surface of the plate with different temperatures. The thickness of the plate decreases under the influence of an aggressive medium. The corrosion of the plate is dependent on the temperature. The mathematical formulation of the problem is given. At present, the causes leading to plate cracking, are being studied.

Work: Fatigue failure of torsion of triangle with a cross-section

Executor: res.ass., N.M.Nagiyeva

The problem of fatigue failure of a bar with its pulsating torsion is solved. The bar has a triangle cross-section. The problem is solved in two stages. In the first stage, the problem of determining the stresses and strains in the bar under consideration is solved with its pulsating torsion. As a result of this solution, the intensity of residual deformations in each period of pulsating loading is determined. In the second stage, using the fatigue strength criteria, the number of pulsating torsions before fatigue failure is determined.

1. L.Kh.Talybly, N.M.Nagiyeva. On fatigue of materials with regard to incubation period of failure and influence of loading history // Journal of Baku Engineering University – Mechanical and Industrial Engineering, 2017, vol.1, №1, p.21-25

2. Н.М.Нагиева. Упругопластическое пульсирующее кручение и усталость бруса узкого прямоугольного поперечного сечения // Azərbaycan Texniki Universiteti, Elmi əsərlər, 2017, №4, c.121-127

II. Scientific organizational activity

Members of the department were published - 2 articles and a theses. 3 articles were submitted for publication.

Head of the department Latif Khalil oglu Talybly is a member of Academic Council and editorial staff of the journal "Proc. of Imm".

The employee of the department, the scientific researcher N.M.Nagieva, presented to the dissertation council of the Institute, her thesis on the topic: "Investigation of fatigue damage of various rods and plates" for defence.

Every Friday in the department held a seminar.

Head of Department

doct.phys.math.sci., prof., L.Kh.Talybly