

# **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 were 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 was solved. An exact solution of the problem was obtained.

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 was 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 was solved.

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 was 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 was chosen. The problem was solved.

1. Mammadova M.A, Mammadova H.A. Scattered failure of damaged beam in bending under monotone loading conditions // *International Journal of Engineering and Innovative Technology*, 2018, vol.8, issue 3, p.30-33.
2. Mammadova M.A, Mammadova H.A. Solution of the problem of stress-strain state of physically nonlinear hereditarily plastic infinite plate with a hole at the action of internal pressure // *Journal of Scientific and Engineering Research*, 2018, vol.5, issue 10, pp.53-58
3. Mammadova M.A. Determination of inverse creep of infinite hereditarily elastoplastic plate with hole after instantaneous removal of internal pressure // *International Journal of Engineering Research and Applications*, 2018, vol.8, issue 11 (part I), pp.38-42 imp.fac. 5.179
4. Mamedova M.A. Solution of a viscous-elastic problem of a circular plate loaded with moment along the inner contour / *Akademik Azad Mirzəcanzadənin 90 illik yubileyinə həsr olunan beynəlxalq konfrans*, Bakı, 2018, 13-14 dekabr.

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

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

The uniform strength of the hole in the plate with a crack was determined. The plate is reinforced with stringers. Given the formulation of the problem and its solutions.

1. Мир-Салим-заде М.В. Частичное закрытие трещин со связями в подкреплённой пластине с отверстием // *XIX Межд. научно-техн. конф. «Актуальные проблемы строительства, строительной индустрии и промышленности»*, Тула, 28-29 июня 2018 г, с. 99-101.
2. Мир-Салим-заде М.В. Частичное закрытие прямолинейной трещины, исходящей из контура кругового отверстия в стрингерной пластине //

*Строительная механика инженерных конструкций и сооружений*, 2018, Том 14, № 4, с. 313-322

3. Mir-Salim-zade M.V. Slit system partial closure simulation in a stringer reinforced perforated isotropic medium // *Journal of Mechanical Engineering*, 2018, vol. 21, no. 3, p. 65-74.

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

1. Mammadova M.A, Mammadova H.A. Scattered failure of damaged beam in bending under monotone loading conditions // *International Journal of Engineering and Innovative Technology*, 2018, vol.8, issue 3, p.30-33.

2. Mammadova M.A, Mammadova H.A. Solution of the problem of stress-strain state of physically nonlinear hereditarily plastic infinite plate with a hole at the action of internal pressure // *Journal of Scientific and Engineering Research*, 2018, vol.5, issue 10, pp.53-58

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

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

The formulation of the corresponding problem of determining the time of complete corrosion wear of the plate, of which on the surfaces affects aggressive medium of different temperatures, was given. 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 was given. A solution is obtained which determines the time of complete corrosion wear of the plate under consideration.

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

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

## **II. Scientific organizational activity**

Members of the department were published - 7 articles and 2 theses. 5 articles were submitted for publication.

There were references to scientific works of department employees (L.Kh.Talybly, R.A.Kazimova, E.T.Bagirov).

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.Nagiyeva, defended her thesis "Investigation of fatigue damage of various rods and plates" to the dissertation council of the Institute.

Every Friday in the department held a seminar.

Head of Department

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