

Ministry of Science and Education  
Institute of Mathematics and Mechanics  
REPORT

On scientific and scientific-organizational activities for the first half of 2024 of the Department of Wave Dynamics.

Scientific direction: Mechanics of deformable solids.

Topic: Dynamics of fixed networks and inhomogeneous bodies, study of free vibrations of a plate.

Scientific activity: During the reporting period, 2 theses were published and 3 articles were submitted for publication.

About individual cases:

Work A: The influence of the structure of the earth's crust on wave processes that occur during earthquakes. Doctor of Physics and Mathematics, Head. department Rasuloval N.B., Ph.D. leading researcher Rasulov M.B.

The reasons for the occurrence of earthquakes in some southern regions of the Republic of Azerbaijan, different from ordinary ones, are being clarified. To do this, taking into account the structural features of the regional crust, the event is modeled as a non-stationary problem of elastodynamics. An analytical solution to this problem is given in the presented work.

During the reporting period, 2 articles were submitted for publication and 1 abstract was published.

**1. N.B. Rassoulova, T.M. Mahmudzade.**

**Effect of the features of the Earth's crust on wave processes during earthquake.**

Modern problems of mathematics and mechanics" dedicated to the memory of the brilliant Azerbaijani scientist and thinker of the 11th century Nasireddin Tusi.

**Work B: Study of changes in the compression ratio of internal combustion engines. Doctor of Physical and Mathematical Sciences, prof. Agalarov J.G.**

The change in parameters of internal combustion engines (depending on pressure and volume) was calculated for two different gear rotation speeds (2000 rpm and 4000 rpm). It has been shown that a large pressure drop with increasing speed also leads to a decrease in the efficiency factor. In the future, it is planned to study the effects of increasing the compression ratio.

**Work D. Stability of rotating rod bodies, and vibrations of this system in the environment.**

**Ph.D. leader Researcher Seifullaev F.A.**

The problem of forced vibrations of rotating membranes reinforced with rods of initial tension with the environment has been studied, the influence of the initial tension of reinforced rods and the parameters of forced vibrations of the medium on the amplitude and frequency of vibrations have been determined.

During the reporting period, 1 article was submitted for publication and 1 abstract was published.

**Work E. Investigation of fracture in anisotropic materials.**

senior researcher **Aliev I. Y.**

This paper investigates the problem of a central crack located in some anisotropic materials. The material has a crack at the edges. The solution of the problem is reduced to singular integral equations. The intensity coefficient

is found for the edge crack. The effect of the object's geometric and physical parameters on the stress intensity coefficient is studied.

Work by F.

**Doctor of Physical and Mathematical Sciences, Leading researcher A.D. Zamanov.**

**About scientific and organizational activities:**

Head Department Doctor of Physical and Mathematical Sciences N.B.

Rasulova supervises the preparation of 1 Doctor of Philosophy, 1 Doctor of Science.

Leading researcher of the department. Seyfullaev F.A. is engaged in teaching at the Azerbaijan Institute of Architecture and Construction.

**Head of department:**

Doctor of Physical and  
Mathematical Sciences,  
Associate Professor N.B. Rasulova

