CONTENTS AND ABSTRACTS

Keynote Lectures

Aghayan K.L.
*On stress concentrators like stringers and cracks in an infinite plate and strip* .............................................. 5
Several works related to the contact and mixed problems of the theory of elasticity, which explores issues of mutual influence of two types stress concentrators in an infinite plate and strip are presented. Due to appropriate choice of the relative location of the stringers and cracks, sometimes it can be possible to reduce significantly the coefficient of intensity of breaking stresses at the ends of cracks.

Hakobyan V., Dashtoyan L.
*Plane stress state of orthotropic plane with slits and absolutely rigid inclusion* ........................................ 10
The exact solution of one mixed boundary value problem for orthotropic plane with absolutely rigid inclusion and two slits on one of the orthotropy principal direction is built on the base of results obtained in [1].

Knyazyan N.B.
*Some aspects of the destruction of oxide and fluorine-containing oxide glasses* ................................. 15
Experimental research has revealed that effect on the microhardness of the oxyfluoride glasses are making a contribution not only the glass transition temperature and the degree of filling of the three-dimensional frame of glass, but the energy of individual bonds of framing elements. When the ratios of components are changing in a wide range, which leads to significant structural changes, the microhardness may not always be a linear function of the composition.

Kuvyrkin G.N., Savelyeva I.Yu.  ......................................................................................................... 20
*The mathematical model of the continuous medium for the effect of nonlocality*
The thermomechanical model of materials with small-sized structure that takes into account the temporal effects in the accumulation and distribution of heat and deformation, as well as the effects of spatial nonlocality and rotational degrees of freedom of the structure elements is proposed.

Radayev Y.N. ........................................................................................................................................ 25
*Three-dimensional representations of the stress tensor in semi-plastic and full plastic states*
New general forms of three-dimensional equilibrium equations of continuum mechanics are obtained by representations of the symmetric stress tensor as symmetrized mixed diades of asymptotic directors. The study employs notations and terminology known from the mathematical theory of plasticity. However all results remain valid for stress fields in an arbitrary continuum. The simplest and analytically most efficient stress tensor representations for full plastic (Haar–Karman hypothesis), semi-plastic and non-plastic three-dimensional states given by mixed diades of asymptotic directors are discussed. Stress tensor representations by the asymptotic directors involve the intermediate principal stress and the Lode parameter. The asymptotic directors provide a natural tensor basis for the symmetric stress tensor different from the spectral forms. The general vector forms of three-dimensional equilibrium equations are separately derived for the full plastic, semi-plastic and non-plastic states. Integrability conditions for these equations are discussed.

Sumbatyan M.A. ................................................................................................................................... 30
*Combination of optimization and BIE methods for defect identification in the elastic media by Ultrasonic waves*
We study the problems on defect identification in the elastic media via scanning by Ultrasonic waves. In the dynamic formulation the problem can be reduced to a system of Boundary Integral Equations (BIE) over the boundary surface of the defects. When solving direct diffraction problems with *a priori* known defect’s geometry, the problem is solved by a standard collocation technique. However, in the inverse defect identification problem the geometry is not known, and in fact represents an additional
set of parameters, to be determined. As a result we come to a system of nonlinear equations which are solved with the use of modern optimization methods. Then we demonstrate some example of identification for defects of complex shape.

**Manzhirov A.V.**

Interdisciplinary problems in mechanics of growing solids

Problems of growing solids mechanics which need additional information from physics, chemistry, biology, and other sciences to be solved are under discussion. They arise from mathematical modeling of various technological and natural processes and very important for practical applications.

**Section reports**

**Avetisyan S.A.**

Two Adjacent Boundary Value Problems Of Filtration Theory And Elasticity Theory For Exponentially Heterogeneous Stripe

Two adjacent problems of plane filtration theory for liquid and elasticity theory under antiplane deformation for exponentially heterogeneous stripe are considered.

**Azatyan G.L, Gevorgyan R.S, Poghosyan H.M.**

Asymptotic solutions of dynamic problems for two-layer ring plate with electroelastic layer

By asymptotic integration of the equations of three-dimensional problems of the theory of elasticity and electroelasticity are derived recurrence formulas for the determination of the components of the stress tensor, the displacement vector and the electric potential of a two-layer plate of infinite longitudinal dimensions with a circular hole. One layer of plate is an electrically conductive with zero ohmic resistance and the other one is piezoceramic and the polarized along the thickness. Examined cases when on the faces of the plate electric potential together with the conditions of the first and mixed boundary value problems of the theory of elasticity are given. Dispersion equations of the resonant frequencies of oscillation are obtained. Part of the resonant frequencies of the plate is calculated.

**Aizikovich S.M., Vasiliev A.S., Volkov S.S., Mitrin B.I.**

An approximated analytical solution of axisymmetric contact problems for a soft elastic layer inhomogeneous by depth

Analytical solutions for contact problems involving elastic homogeneous layer were obtained in [1–4]. Their applicability was restricted to the cases of a thick layer [1, 2], a thin layer [3], and a layer which thickness is comparable to width of a punch [4].

Due to wide use of functionally graded materials and coatings in industry, contact problems for media having varying with depth elastic properties are of particular interest. Recent results in such problems are obtained mostly in sight of special assumptions on the form of elastic properties variation (linear, power law, exponential, and so on), which allows one to use exact analytical solutions for corresponding differential equations [5-7]. Coatings with arbitrary variation of elastic properties by depth were considered by Y.-S. Wang et al. [8] and S.M. Aizikovich et al. [9-12].

Usually substrate is assumed to be undeformable when a soft elastic layer is considered [1-7]. But even the toughest materials have elastic properties, for example, Young’s modulus of the diamond is 1000 GPa. Young’s modulus of soft metals (Al, Cu, Pb, Ag, and others) varies from 16 to 125 GPa. Young’s modulus of polymers (plexiglas, polystyrene, polyvinylchloride) – from 1 to 4 GPa. So the ratio of the Young’s moduli of the layer and the elastic substrate usually is equal to 10–100 and in rare cases can be up to 1000 and greater.

In this paper we consider elastic layer inhomogeneous by depth, which is located on an undeformable substrate which elastic modulus differs more than 10 times from that one of the layer. Approximated analytical solutions for the torsion and the indentation problems for a rigid flat circular punch are constructed. Effect of the hardness of the substrate and the inhomogeneity of the layer on characteristics of the contact interaction was studied.
Hakobyan H. Yeghiazaryan T. ..........................................................................................................................55

**Vibration of the plate in the supersonic flow of gaze**
The problem of the hinged on two edges plate streamlined by supersonic flow of gas by speed U is considered. The dimensions of plate are a,b. As an expression of dynamic forces acting on the plate are taken the expressions which were obtained by “piston theory” and by refined theory. Results for the flat one-dimensional problem on the methods of Galyurkin and Ritz are obtained and comparisons of the results are given.

Hakobyan L. ................................................................................................................................................59

**Contact problem for elastic plane with semi-infinite slit, perpendicularly located against finite crack**
The stress state of homogeneous elastic plane, weakened by semi-infinite slit, perpendicularly coming to the middle of finite crack and deformed by two same absolutely rigid stamps, located in symmetric regions of opposite banks of semi-infinite slit is considered. The governing system of singular integral equations is obtained. The solution of the system is built by numerical-analytical method of discrete singularities.

Amirbekyan A.N., Shekyan A.L., Shekyan L.A. .........................................................................................64

**On the contact problem of the bending beam of finite length of the elastic strip in view of shear forces**
The contact problem of the bending of the beam of finite length on elastic foundation in the form of a strip in the plane strain conditions, the generalized model of the bend in the framework of S.P.Timoshenko, where in addition to vertical forces axial compressive or tensile forces also affect on the deflection of the beam is considered.

Owing to method of singular integral equations (SIE) in combination with known numerical and analytical solutions of SIE, the problem is reduced to regular system of linear algebraic equations.

Antonyan S., Vasilyan N. ............................................................................................................................69

**The stress-strain state of bending plate around of hinged edges**
In this article investigated stress-strain state of plate bending problem around of hinged and simply supported edges, applying the approach Nadai[1]. By theory of S.A. Ambartsumian, which takes into account the transversal shear deformations, is identified the difference of boundary conditions. The difference for cutting forces based on theory S.A. Ambartsumian and Kirchhoff theory around of a fixed edge of the plate is obtained.

R. V. Ardazishvili ....................................................................................................................................74

**Three-dimensional surface wave for mixed boundary conditions on the surface**
The paper concerns the propagation of surface waves localized near the edge of half-space subject to different boundary conditions. To derive the dispersion equation for each type of boundary conditions three-dimensional equations of theory of elasticity are used. Then mathematical analyses performed for all dispersion equations and it shows that root, i.e. surface wave, exist only in two types of boundary conditions. Numeric results of phase velocities depending on angle of propagation and Poisson's ratio are demonstrated. It is noted that for fixed Poisson's ratio phase velocity of surface wave tend to phase velocity of Rayleigh wave. Numerical results of waveforms for two types of boundary conditions are presented.

Arzumanyan A. M., Hakobyan S. H. ...............................................................................................................79

**Comprehensive study of processes of thin edge cutting-ferrous metal and alloys**
In a competitive environment in engineering and instrument improving the way of blade non-ferrous metals and alloys, directed to increasing the efficiency of the cutting process, accuracy, surface quality and processing performance, is an actual problem for the development of the various branches of engineering.

Arutyunyan A.R., Arutyunyan R.A., Yakimova K.S. ................................................................................84

**Radiation ageing, creep and creep fracture of metallic alloys**
Numerous experimental studies show that under the attack of irradiation mechanical characteristics of metallic alloys undergo significant changes, caused particularly by the aging processes. The following effects are observed: low temperature and high temperature creep and creep fracture, irradiation aging and embrittlement. Numerical experimental results are received on creep, aging and creep fracture. Here one can see the significant increase of the creep rate. The time to fracture decreases many times depending on temperature and irradiation dose. In world literature these effects are investigated well in the context of physical material science. At the same time not enough attention is paid to describe the effects integrally by the mechanic of materials methods in the framework of mechanical parameters. In the presentation these methods are applied to formulate the creep equation and creep fracture criterion, based on the energy conservation law. The theoretical curves of creep and long time strength for different values of irradiation dose are constructed and compared with the corresponding experimental results.

Balasanyan E.S., Petrosyan G.A. ........................................................................................................ 88

Asymptotic solution of one mixed boundary problem of anisotropic two-layer plate
A question of solution stress-strain state in three dimensional problem for an asymptotic plate, with full contact between the layers, is considered. In the surface of plate are given mixed conditions of theory of elasticity. With appliance of asymptotic method of integration, solutions of the interior problem are built. Some cases examples are considered.

Balashnikova A. V. ............................................................................................................................... 93

The ultimate state of spatial layer of perfectly plastic material when translational anisotropy, compressed rough slabs
In work compression of ideal plastic layer by rigid rough plates in case of transmitting anisotropy in case of flat deformation is considered [1], [2]

Barseghyan T. ....................................................................................................................................... 96

Problem of Control of a stage by stage changing linear system with intermediate conditions
This paper suggests an approach to solve the problems of control of a stage by stage changing linear system with non-separated intermediate conditions. Solution to a specific problem is given.

Belubekyan M. V., Davtyan A. A., Mheryan D. H. ......................................................................... 101

The surface waves on the system of the opposite splitting of layer and semi-space
It is assumed that on the surfaces of bounding layers the conditions of splitting contact take place. The layer and the semi-space are moving relative to each other with constant velocity V. The dispersion equation which defines the phase velocity of surface waves has been received. The conditions of existence of the surface wave, in the particular in the case of the same material of the layer and the semi-space have been occurred. It has been investigated short wave and long wave approximations, for which it has been determined, phase velocity depending on the elastic properties of the material layer and the semi-space.

Berberyan A. ....................................................................................................................................... 106

Propagation acustoelectric gap wave in functionally graded piezoelectric structures
The propagation of electroelastic waves in structure, containing elastic bottom layer, piezolayer, air slot, functionally graded piezoelectric layer is considered.

Berdnik Y.A. ....................................................................................................................................... 109

Semi-analytical method for the Navier-Stokes equations in the problem on a homogeneous flow of viscous fluid around a linear plate
Many published works [1],[2] have been devoted to the problem at hand, in frames of the boundary-layer theory. The new point in our approach is that we operate with exact Navier-Stokes equations. We also apply a new method to study the problem, which is an iteration scheme for perturbations with respect to the basic flow. The perturbations are assumed to be small when compared to the previous step that implies a certain linearization. At each iterative step there is solved an integral equation
regarding function of viscous friction force over the plate. The solution, obtained at each iteration, is compared with the classical Blasius solution [3].

Vakulenko A.M.................................................................................................................................114

Estimation of the breaking loads in ice ridges interaction with a hydraulic structures
The work in this paper is dedicated to refinement of ice loads on hydraulic structures of the continental shelf and to development of a method of modeling in the finite element program PLAXIS 2D. The existing analytical methods for calculating the loads from the ice ridge keel on vertical offshore structures according to foreign and domestic regulations were considered. According to foreign and local regulations documents methods for calculating loads from the ice ridge keel on a sloping structures are absent. Recommendations and assumptions of analytical solution calculation are given in the case on vertical structures. The results obtained from the numerical and analytical models are in a good correlation. The main advantage of the developed numerical method is the ability of calculation the ice breaking load in case of interaction ice ridge keel with structures of any shape and configuration.

Verlinsky S.V., Levonyan H.L., Shekyan A.L ..............................................................117

Numerical simulation of the stress-deformation and temperature state of the bearings in the ANSYS
In the problem is modeled bearing with finite length. The bearing loaded by moments and radial forces. Taken into account wear and heat from friction. Required to determine the temperature that occurs when different modes of operation of the bearing, as well as the stress-strain state, depending on the temperature arises.

Garakov V.G., Martirosyan E.V........................................................................................................120

Magnetoelastic shear waves in a perfectly conducting layer
The propagation of pure shear magnetoelastic waves in a perfectly conducting layer is considered in the event of magnetic field is parallel to the plane of propagation of the wave. The presence of longitudinal and transverse to the direction of the wave vector components of the magnetic field tension leads to the appearance of a member with a mixed derivative in the wave equation. The problem is solved for different boundary conditions on the surface layers. Phase and group velocity are determined based on the dispersion equation. As well, the influence of the magnetic field on the oscillation frequency, when the magnetoelastic wave cannot be propagated, is investigated.

A.V. Gasparyan .........................................................................................................................124

On the application of the finite-difference equations method in problems of elasticity theory
A brief account of the results of application of finite-difference equations method in boundary problems of elasticity theory on different layered composites under anti-plain deformation is presented.

Grigoryan M.S. ..........................................................................................................................129

On two adjacent problems of filtration theory and elasticity theory for a wedge-shaped domain
Boundary problem of plain steady-state filtration theory and adjacent problem in terms of elasticity theory are considered for a wedge-shaped

Grishin V.I., Kacharava I.N.............................................................................................................134

Evaluation of rational design parameters in structure of the metal-composite bolted connections
Local stress of metal-composite bolted connections in the joint of wing panel with the central section of the airframe is considered. Rational structure parameters of bolted connection for the maximum load capacity are obtained.

Grishko A. M. .........................................................................................................................137

On a problem of stability of two layered plate in a supersonic gas flow
In this paper, we consider the problem of dynamic instability of a non-symmetric non-homogeneous over thickness rectangular plate. The asymmetry is treated as follows. In the case when functions of
mechanical characteristics of plate’s material are continuous with respect to the plate thickness coordinate, they are not symmetrical with respect to the median plane. In the case when the functions are a piecewise continuous (layered plates), then the problem is asymmetric with respect to any plane of the layers and the middle surface. In both cases the equations of planar and bending vibrations of the plate are not separated [1]. The dependence of the critical velocity on dynamic instability from the parameter that depends on the conditions of asymmetric is obtained. According to the obtained results the numerical examples are given for a two-layered plate.

Ghulghazaryan L.G. .......................................................... 142

The Character of Natural Vibrations of Orthotropic Shell at the Boundary Layer in the Presence of Viscous Resistance

Basing on the equations of three-dimensional problem of elasticity theory, asymptotic solutions of non-classical boundary value problems of natural vibrations of orthotropic shells at the boundary layer in the presence of viscous internal resistance are obtained when the top front surface of the shell is given with two choices of spatial boundary conditions, and a displacement vector is given at the bottom surface. Functions of boundary layer type and characteristic equations for detecting the speed of boundary layer vibrations damping from the edge surface into the shell are obtained.

Davtyan A.V .......................................................... 147

Unsteady plane problem of healing of fracture in the absence of frictions

In present report considered the mixed boundary problem for crack with fluid in thermoelastic plane. The problem is solved by Winner–Hopf method and obtained analytical formula in the form Smirnov-Sobolev for vertical displacement of boundary of crack.

Dinunts A.S., Davtyan A.V., Martirosyan G.A .......................................................... 151

Unsteady plane problem of healing of fracture moving with the arbitrary velocity

In present report by convolution method the problem of healing of moving with the arbitrary velocity semi-infinite thin fracture, by current of mixture of fluid-cristallines in it, within infinite thermo-elastic medium is solved.

K. A. Zhamakochyan .......................................................... 156

Application of the Method of Power Series for Construction of Mathematical Model of Micropolar Elastic Thin Bars

Dynamic equations, boundary and initial conditions of plane stress state of the micropolar theory of elasticity with independent fields of displacements and rotations are considered in thin rectangle. Using the method of expansion to power series along the thickness of rectangle and based on the initial approximation, applied one dimensional model of dynamic bending of micropolar elastic thin bars is constructed. It is shown that the constructed model coincides with the analogical model of micropolar bars, constructed on the basis of the asymptotically justified hypotheses method.

Zarubin V.S., Savelyeva I.Yu .......................................................... 161

Simulation Of Thermal Interaction Inclusion And Matrix Composite

The mathematical model of heat transfer in a composite with inclusions of spherical shape is constructed. The formulas for the thermal conductivity of the composite are obtained. The case of an ideal thermal coupling inclusions and the matrix, the case complete lack thermal contact at the interface between the matrix and the inclusion, and the case having an intermediate layer between the switching matrix are examined.

Ivchenko S.V .......................................................... 166

Short-wavelength diffraction by the system of obstacles of canonical shape in a bounded acoustic space

On the basis of the geometrical diffraction theory there are studied the trajectory of multiply reflected high-frequency waves and their amplitude in the acoustic medium bounded by a parallelepiped with rigid walls containing reflectors of cylindrical and spherical shape. There is performed a quantitative
analysis of a standard model used in the problems of applied acoustics, when boundary surfaces are replaced by planar faces of the inscribed or circumscribed polyhedra.

Ghazaryan H.A.................................................................171

Diffraction of surface shear electro-elastic wave on the semi-infinite metal layer in piezoelectric-dielectric space

The problem of diffraction of surface shear electro-elastic wave is reduced to the solution of Riemann problem in analytic functions theory, using real Fourier transformation and a solution of a functional equation. The presence of the semi-infinite metallic layer leads to a propagation of diffracted volume and surface electro-elastic waves.

Kalidzhyan L. ........................................................................................................176

Elastic waves in the layer half-space in the presence of a longitudinal magnetic field

The possibility of occurrence and propagation of waves of Raleigh type in an electro conductive elastic infinite layer half-space when on the surface of layer are realized the conditions of sliding contact. In the initial state layer half-space is in a constant magnetic field. It is established that the appearance of surface waves depends both on the Poisson’s ratio and the ratio of layer thickness and wavelength.

Melkonyan A.V., Sarkisyan S.V.........................................................181

Application of Radon integral transform in wave propagation problems for half-space

In this paper on the basis of Radon integral transform is investigated the problem of wave’s propagation in an elastic half-space when on the boundary of half-space the condition of constrained free edge are given. The dispersion equation for surface wave propagation speed is obtained.

Mkrtchyan M.M ..........................................................................................185

Solution of problems of torsion of prismatic bars with cross-sections in the form of a segment and a triangle by the boundary integral equations method

Two problems of the torsion of elastic prismatic bars with cross-sections in the form of an arbitrary circular segment and an isosceles triangle, which are solved by the method of boundary integral equations (BIE) connected with boundary problems for harmonic functions, are considered.

Hovhannisyan H. V., Aghabekyan P.V., Khurshudyan M. Zh. .........................190

To a mixed problem for an elastic piecewise–homogeneous (composite) sheet with two finite cracks

Here we consider a mixed problem of the theory of elasticity for an elastic composite (piecewise-homogeneous) plane with two final rectilinear cracks. It is assumed, that with respect to two half-planes heterogeneity line asymmetrically situated finite rectilinear cracks are perpendicular thereto and are located on the same line. The plane is deformed by normal stresses applied on the crack edges and simultaneously by uniformly distributed horizontal stresses of piecewise–constant intensity, acting at infinity of composite plane. The problem is formulated as a system of singular integral equations under certain conditions on the unknown functions, the solution of which is reduced to solution of a set of quasicompletely regular system of infinite linear algebraic equations by well–known technique of Chebyshev orthogonal polynomials. The fracture stress intensities near cracks tips are determined.

Papyan A. A ...............................................................................................195

The magnetoelastic vibrations of conductive plate-strip in the longitudinal magnetic field.

On the basis of the hypothesis of Kirchhoff and the hypothesis of magnetoelasticity of thin bodies of S. A. Ambartsumian, G.E. Bagdasaryan, M. V. Belubekyan the problem of magnetoelastic vibrations for plate-strip is solved. The equations of planar and transverse vibrations are obtained. The frequency vibrations are identified depending on the intensity of magnetic field.

Poghosyan D.M..........................................................................................200

The influence of dissipation on transverse vibrations of “elastic fastened” vertical rod under influence of follower load
The stability of non-conservative rod systems is investigated, considering the different types of friction. The destabilization effects due to friction are established.

**Popuzin V.V.**

*An explicit-form representation for the kernel of integral equation in the crack problem for a porous elastic material*

The paper is concerned with a solution of crack problem in the porous elastic material in frames of Nunziato and Cowin model. With the help of Fourier transform the problem is reduced to an integral equation over the boundary of the crack. We perform some analytical transformations to calculate the kernel of the integral equation in explicit form.

**Sargsyan M.G., Ispiryan T.G., Harutyunyan A.S.**

*Optimization of fixing conditions in the problems of beam bending by stiffness criteria*

This paper focuses on the problem of optimization of fixing conditions (selection the locations of supports) in the bending problem of statically indeterminate beams under uniformly distributed load by criteria of stiffness. Shown that the equation of the elastic line of the beams in these problems is the linear combination of functions which form Chebyshev system, using theory of best approximation is permissible for solving these problems. By using this theory on problems of fixing conditions (selection the locations of supports) the solutions of tasks of one and three times statically indeterminate beams has been obtained.

**Sargsyan M.Z.**

*On the stress-strain state of two isotropic bands connected in the junction*

The problem of determining the stress-strain state of a system of two isotropic bands connected to the joint is considered. On the upper longitudinal edge of bands are given the corresponding components of the stress tensor, and the lower edge is rigidly fixed. Damping rates of values in the boundary layers of the first and second bands are researched. The characteristic equations for the determination of the damping rates are obtained. Conjugation of solution of the inner problem and the boundary layer near the the junction is conducted.

**Sargsyan A.H.**

*Asymptotical Substantiation of applied dynamic Theory of Micropolar Elastic shells with Independent Fields of displacements and rotations*

In present work on the basis of asymptotical method in thin area of shell internal problem, boundary layer and boundary layer by time for dynamics of micropolar elastic shells are constructed, and the question of their merging is studied. At level of internal problem the applied dynamic theory of micropolar elastic shells with free rotation constructed on the basis of the hypotheses method are proved.

**Sarkisyan N.S.**

*About a Mixed Boundary Value Problem of Anisotropic Two-Layer strip–rectangle on the Base of Geometrical Non-Linear Theory of Elasticity under incomplete contact between layers*

The question of determining the stress-strain state in the plane problem for an anisotropic laminated strip for geometrically non-linear elasticity with incomplete contact between the layers is investigated. It is considered that on one of the longitudinal edges of the strip are given the normal component of the displacement vector and tangential stresses, and on the other, the conditions of the first boundary-value problem of elasticity theory. The solution of the corresponding to internal problem is constructed.

**Simonyan H.G., Kirakosyan G.N.**

*On the optimal stabilization of a mathematical pendulum with a variable length*

The problem of optimal stabilization of a mathematical pendulum, when its length changed according to the given law, has been treated. The system of differential equations of controlled motion of the pendulum has been made up. Confining to small oscillations and introducing the small parameter, the
problem of optimal stabilization of the mathematical pendulum at lower equilibrium position in case of small oscillations has been formulated. The problem has been solved by using Lyapunov – Bellman method. An optimal Lyapunov function and an optimal control action have been constructed.

Srapiyan J. L. ................................................................. 231
The vibrations of unmoment orthotropic cylindrical shell with variable curvature, with free ends and rigid-clamped boundary generators
The free edge vibrations of orthotropic unmoment non-closed cylindrical shell with variable curvature, with free ends and rigid-clamped boundary generators are studied.

Stepanyan A.A. ................................................................................................................................... 236
On one coalition differential game on the plane at two target sets
In the work a coalition linear differential game of three persons is considered at two target sets. The conditions of a choice of extreme strategies and optimum values of the coefficients describing the share of players in a coalition are received.

Fedyeva K.E. ..................................................................................................................................... 241
Impact of the floating in an incompressible liquid plate, in the presence of a contact on its back side.
In [1] the plane problem of the vertical stroke of the horizontal rigid plate immersed in an incompressible liquid with a free surface has been considered. The fluid occupies the halfspace. In this work, the contact area is not taken into account. In this paper, this problem is considered in consideration of the contact area of the plate. Research has shown that taking into account the contact area on the back side of the plate substantially changes the velocity field in the region occupied by the liquid.

Khakalo K.A., Indeitsev D.A., Vavilov D.S. ..................................................................................... 246
Thermoelastic waves in metals and dielectrics
In this work generation and propagation of the thermoelastic waves in a metals and dielectrics induced by an ultrafast laser pulse are considered. To describe wave propagation in metals two-temperature model was used. An analytical solution was obtained using Laplace transform. Finite element modeling of the wave propagation was also performed. The two-temperature model was implemented in FEM package, ABAQUS. Results were compared with those obtained without considering the two-temperature model.

Amiri H.Y., Mkhitaryan D.A. ........................................................................................................... 251
Application of polymers in modern construction
Either ordinary concretes with polymer additives are used in practice, either materials in which polymer is considered to be the unique binder. The choice of polymer is defined by the sphere of use of concrete and character of possible influences.

Khurshudyan A. Zh., Sarkisyan A. S. .............................................................................................. 256
On adhesive binding optimization of elastic homogeneous rod to a fixed rigid base
The problem of finite, partially glued to a fixed rigid base rod longitudinal vibrations damping is investigated by optimizing adhesive structural topology. Vibrations are caused by external load, concentrated on free end of the rod, the other end of which is elastically clamped. The problem is mathematically formulated as a boundary-value problem for one-dimensional wave equation with variable controlled coefficient, and the maximal length of adhesion is taken as optimality criterion to be minimized. Structure of adhesion layer, optimal in that sense, is obtained as a piecewise-constant function. Using Fourier real generalized integral transform, on the bases of finite control method, the problem of unknown function determination is reduced to determination of certain switching points from a system of nonlinear, in general, complex equations. Some particular cases are considered.
To a problem of vibrations of adjoining semi-infinite plates on a surface of elastic medium

The problem of vibrations of the coating consisting of two half-planes, bordering along a straight line on an elastic foundation is discussed.

Dynamic problems of the elasticity theory for plates on deformable foundation have applications in construction, engineering, materials science and other fields. In seismology, the interaction of lithospheric structures as contacting deformable plates placed on an elastic foundation can also be studied in terms of the theory of mixed problems of elasticity.

Two-dimensional elastic plates with the average thickness parameters are considered as components of coatings. The infinite crack passes on the border between the plates. Contact between the coating and the substrate is ideal, an elastic medium containing no defects treated as substrate. Applying the differential factorization method systems of integral equations concerning the stresses between the coating and the foundation are constructed. Solutions of received integral equation’s systems are obtained with integral factorization method of Wiener–Hopf. Difficulties caused by the polynomial growth of the elements of kernel’s symbols are overcome by moving a differential operator outside. The unknown functions included in the solutions are determined from the given boundary conditions for the plates.

Analysis of motion of a pendulum with vibrating suspension axis at unconventional values of parameters

The present paper is concerned with the analysis of motion of a pendulum with vibrating suspension axis at unconventional values of parameters. Case, when frequency of external loading and the natural frequency of the pendulum in the absence of this loading are of the same order, is studied. Vibration intensity is assumed to be relatively low. A new modification of the method of direct separation of motions (MDSM) is proposed to study corresponding equation, which in the considered case doesn’t contain a small parameter explicitly. The aim is to obtain solutions of this equation in the stability domain. It is revealed that in the considered range of parameters not only the effective stiffness of the system changes due to the external loading, but also its effective mass. It is noted that application of the classical asymptotic methods in the case under study leads to erroneous results. So, the applicability range of the MDSM turns out to be broader than the one of these methods.