

**SCIENCE AND EDUCATION
IN KARAKALPAKSTAN**

**ҚОРАҚАЛПОҒИСТОНДА
ФАН ВА ТАЪЛИМ**

**ҚАРАҚАЛПАҚСТАНДА
ИЛИМ ҲӘМ ТӘЛИМ**

**НАУКА И ОБРАЗОВАНИЕ
В КАРАКАЛПАКСТАНЕ**

1-сон

Нукус

2019 й.

ISSN 2181-9203



Science Magazine

Chief Editor:

Reymov A.

Deputy editor in chief:

B.Utemuratov

Executive secretary:

Sh.N.Abdinazimov

Editorial board:

Bazarbaev J. Dr of Ph. academic
Ayimbetov N.K. Dr of Economic Sciences
Turdymambetov I.R. Doctor of Geography
Ataniyazova O.A. Dr of medical sciences
Aleuov W. Doctor of pedagogy
Ubaydullaev Kh. Dr of Economic Sciences
Umarova Q.U. Doctor of law
Berdimuratova A.K. Doctor of Philosophy
Abdullaeva J.A. Dr of Hist. Sciences
Allanazarov K. PhD in Geography
Ayimbetov M.J. PhD in Technical Sciences
Auezov O. Doctor of Tech. Sciences
Baimanov K.I. Dr of Technical Sciences
Bokieva G. Doctor of Philology
Jarimbetov K.H. Doctor of Philology
Ismayilov K.A. Dr of phys-math sciences
Kayypbergenov B.T. Dr of Tech. Sciences
Kayypbergenov A.T. Dr of Tech. Sciences
Qdyryniyazov M.Sh. Dr of Hist. Sciences
Kuranbaev K. Doctor of Philology
Kudaibergenov K.K. Dr of phys-math sciences
Kushiev H. Dr of Biol. Sciences
Mambetnazarov B.S. Dr of Agr. Sciences
Mambetullayeva S.M. Dr of Biol. Sciences
Murtazayeva A.D. Dr of Hist. Sciences
Muslimov N. Doctor of pedagogy
Nishonova Z.T. Dr of psychology sciences
Oripova M.H. Dr of Tech. Sciences
Paluaniyazov P.K. PhD History
Razhapov A. Dr of Tech. Sciences
Sadullaev A. Dr of phys-math sciences, acad
Tagaev M.B. Dr of phys-math sciences
Toreniyazov E.Sh. Dr of Agr. Sciences
Utebayev T.T. Doctor of pedagogy
Holbaev I. Dr of phys-math sciences
Shermuhamedova N. Doctor of Philosophy
Egamberdiev F. Dr of Economic Sciences
Tleumuratov G. PhD in Philology
Kubeysinova D.T. PhD in Philology
Kurbanbaev Dj. A. PhD in Pedagogy
Seytjanov J.E. PhD in Philology

Editorial address:

Street. 1 Ch.Abdirov,
Nukus. 230100,
Phone: 223-60-19

NATURAL SCIENCES

Aytmuratov B.SH. Computer modeling of processes of variation of thin plates located in electromagnetic field	3
Reymov K.M., Najimova A.M., Sarsenbaev D.B., Tolegenov R.B. Prospects for the development of wind power in the Republic of Karakalpakstan.....	8
Turumbetov B.K., Reynazarov E.N. Problems of creating ways to provide information security in e-mails.....	12
Allambergenov N.S., Kengesbaev S.K., Sharibaev M.B. Standards for the fifth-generation networks for IoT	17
Berdimurtov M., Mirzataev S., Rakhimberdiev Q., Turemuratova A. Appli cation of RSA system in electronic money circulation.....	22
Erkaeva N.A., Kucharov B.Kh., Erkaev A.U., Reymov A.M., Kaypbergenov A.T. Development of technology of potassium percarbonate production	26
Erkaev A.U., Orakbaev A.A., Kucharov B.Kh., Zakirov B.S., Reymov A.M., Kurbaniyazov R.K. Volume diagram system $Na^+, K^+, 1/2Mg^{2+} // 1/2SO_4^{2-}, Cl^- -H_2O$ at $0^\circ C...$	34
Jumamuratov M.A. Neutron-activated analysis of the composition of water in the Ecosystem of the Republic of Karakalpakstan.....	39
Abdurahmanov B.A., Bakhadyrkhanov M.K., Ismailov K.A., Ismaylov B.K., Saparniyazova Z.M. Functional possibilities of silicon with clusters of impurity atoms.....	43

AGRICULTURAL SCIENCES

Mambetnazarov B.B. Agro and water saving technologies and approaches of assessing their effectiveness	48
---	----

COMMUNITY SCIENCES

Allanazarov K.J., Baltabayev O.O. The term of zhap and its role in producing toponyms (the research is based on the toponymy Takhtakopir District of the Republic of Karakalpakstan).....	52
Yerejepova J., Urazbaeva L. The significance of lease in developing agriculture.....	56
Abipova G.S. Cost management mechanism of enterprises at joint-stock.....	60

HUMANITIES SCIENCES

Palvanova M. P. Reflection of conception «person» in the story of N.S. Leskova "Scarecrow".....	66
Tajieva A., Ibragimova S. Comparative analysis of English and Karakalpak non-finite forms of the verb.....	69
Tleumuratova N.M. From the history of relations of the Karakalpak with the Uzbeks.....	75
Akimov N.T., Zhumaniyazov K.T., Yesemuratov B.A., Eshbaev A.J. The bases of methodical skill of a teacher of physical training (pedagogue-trainer) in the field of gymnastics.....	79
Seytjanov J. E., Koblanova G.B. Psychological features of the students speech interaction in foreign languages.....	84
Bekniyazov B.S. Khorezm Oasis during the management of Horezmshakhs-Anushteginides..	89
Djumabaeva V.T. Using authentic texts in teaching reading.....	95
Kdirbaeva G.Q., Orazgalieva A.M. Influence of English borrowings on development of Karakalpak vocabulary during the last decades.....	99
Erjanova D. The lexical features of the poem "Field dreams" by I.Yusupov.....	104
Khadjieva D., Saymanova A. Some peculiarities of using antithesis in prose.....	114

For the accuracy of the information presented in the journal are the authors of the article.

UDC 539.37.001.573

COMPUTER MODELING OF PROCESSES OF VARIATION OF THIN PLATES LOCATED IN ELECTROMAGNETIC FIELD

Aytmuratov B.SH.

Nukus Branch of Tashkent University of Information Technologies named after Muhammad al-Khowrezmi

Summary. This article describes the development of an algorithm for calculating magnetoelastic thin plates with a complex shape based on a combination of the R-function methods of V. L. Rvachev and the Bubnov-Galerkin variation method that automates the process of oscillation of magnetoelastic thin plates with a complex shape. The problems of oscillations of magnetoelastic thin plates with a complex shape in the presence of an electromagnetic field are solved.

Key words: modeling equation, variation, magnitoelastic, plats, vibration, Hamilton-Ostrogradskiy, method Bubnov-Galerkin, V. L. Rvachev’s R-function.

Introduction. This paper views the solution of problem about variation of thin plates located in electromagnetic field [1].

Isotropic elastic plate with permanent depth 2h, made from material with final electroconductivity and situated in external magnetic field with given vector of intensity is being viewed. External current and charges aren't present. Electromagnetic field in the plate doesn't change quickly [2-4].

The plate in the Decart x_1, x_2, x_3 coordinate system is situated so, that the middle plaine of middle plane coordinate plaine x_1, x_2 . Hypothose for the internal task analytically will be [1,5-8]:

$$u_1 = -x_3 \frac{\partial w}{\partial x_1}, u_2 = -x_3 \frac{\partial w}{\partial x_2}, u_3 = w(x_1, x_2, x_3) \quad (1)$$

where $w = w(x_1, x_2, t)$ - movement of middle plain of plate being searched, $\varphi = \varphi(x_1, x_2, x_3), \psi = \psi(x_1, x_2, x_3), f = f(x_1, x_2, x_3)$, - required function of the active electromagnetic field.

Then determinant equations for thin plates in some particular cases of external magnetic field.

$$\Delta \varphi - \frac{\epsilon \mu}{c^2} \frac{\partial^2 \varphi}{\partial t^2} - \frac{4 \pi \sigma \mu}{c^2} \frac{\partial \varphi}{\partial t} = - \frac{\mu}{c} \frac{\partial}{\partial t} \left[\frac{4 \pi \sigma}{c^2} B_{02} \frac{\partial w}{\partial t} - \frac{\epsilon \mu - 1}{\epsilon \mu} \left(B_{02} \frac{\partial^2 w}{\partial x_1^2} - B_{01} \frac{\partial^2 w}{\partial x_1 \partial x_2} - \frac{\epsilon \mu}{c^2} B_{02} \frac{\partial^2 w}{\partial t^2} \right) \right],$$

$$\Delta\psi - \frac{\epsilon\mu}{c^2} \frac{\partial^2\psi}{\partial t^2} - \frac{4\pi\sigma\mu}{c^2} \frac{\partial\psi}{\partial t} = \frac{\mu}{c} \frac{\partial}{\partial t} \left[\frac{4\pi\sigma}{c^2} B_{01} \frac{\partial w}{\partial t} + \frac{\epsilon\mu-1}{\epsilon\mu} \left(B_{02} \frac{\partial^2 w}{\partial x_1 x_2} - B_{01} \frac{\partial^2 w}{\partial x_2^2} + \frac{\epsilon\mu}{c^2} B_{01} \frac{\partial^2 w}{\partial t^2} \right) \right],$$

$$D\Delta^2 w + 2\rho h \frac{\partial^2 w}{\partial t^2} = P + \frac{2h^3\sigma}{3c} \left(B_{02} \frac{\partial^2 \varphi}{\partial x_1^2} - B_{01} \frac{\partial^2 \varphi}{\partial x_1 \partial x_2} + B_{02} \frac{\partial^2 \psi}{\partial x_1 \partial x_2} - B_{01} \frac{\partial^2 \psi}{\partial x_2^2} \right) +$$

$$\frac{2h^3\sigma}{3c^2} \frac{\partial}{\partial t} \left[\left(\frac{1}{\epsilon\mu} B_{02}^2 + B_{03}^2 \right) \frac{\partial^2 w}{\partial x_1^2} + \left(\frac{1}{\epsilon\mu} B_{01}^2 + B_{03}^2 \right) \frac{\partial^2 w}{\partial x_2^2} - \frac{2}{\epsilon\mu} B_{01} B_{02} \frac{\partial^2 w}{\partial x_1 \partial x_2} \right] +$$

$$\frac{2\sigma h}{c} \left[B_{02} \left(\varphi - \frac{B_{02}}{c} \frac{\partial w}{\partial t} \right) - B_{01} \left(\psi + \frac{B_{01}}{c} \frac{\partial w}{\partial t} \right) \right] \quad (2)$$

Equations of magnetoelasticity (2) boundary will be solved in following conditions

Freely edge (territory):

$$w|\Gamma = 0, M|\Gamma = 0, \varphi|\Gamma = 0, \psi|\Gamma = 0 \quad (3)$$

and with basic condition

$$\begin{aligned} \dot{\varphi} &= \dot{\varphi}_0, \dot{\psi} = \dot{\psi}_0, \dot{w} = \dot{w}_0, \\ \varphi &= \varphi_0, \psi = \psi_0, w = w_0 \end{aligned} \quad (4)$$

There are unidentified components of magnetic induction B_{0i} , in equation (2) which are identified by Maxwell equation [9].

To solve the given problem (2-4), $a=1m$, $b=0,5m$, $r=0,1$, $h=10^{-2}m$, $E=11*10^{10}H/M^2$, $p=8890 \text{ кг}/M^3$, $\nu=0,3$, $j_{Cl}=-3,673205A/M^2$, $p=1,256*10^6 \text{ Гн}/M$; $\sigma=3,6*10^7 \text{ (Ом м)}^{-1}$; $\epsilon=1$; $C=3*10^8 M/c$; $P=5000 \text{ H}/M^2$ sides are choosen like its geometric and physical parameters [9].

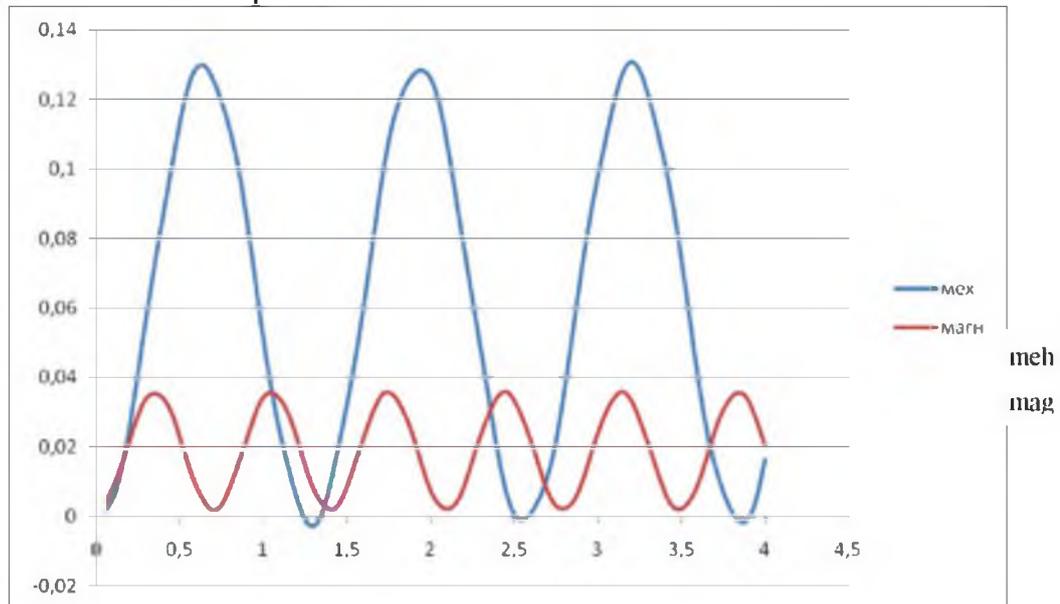
During the solving of this problem the following results were got deflection of plate under pressure of just mechanic forces and under joint pressure of mechanic and electromagnetic forces in appropriate places are shown also there are valves of components of electromagnetic field.

t	$w^*(0;0;t)*10^2$		$w^*(0,5;0,5;t)*10^2$		$\varphi^*(0;0;t)*10^2$	$\psi^*(0;0;t)*10^2$	$\varphi^*(0,5;0,5;t)*10^2$	$\psi^*(0,5;0,5;t)*10^2$
	mex	mag	mex	mag				
0,05	0,1664	0,4414	0,01807	0,018008	-2,4760E-05	3,8143E-05	-1,4987E-05	2,0801E-05
0,4	0,9349	0,34655	4,7396	1,486299	-1,0894E-05	9,8571E-06	-8,7076E-05	9,2244E-05
0,8	0,12791	0,9681	5,7854	0,379888	-9,8869E-06	1,5324E-05	-1,1995E-04	1,0862E-04
1,2	0,4895	0,22877	0,2987	0,862275	-4,9540E-05	-2,3372E-06	1,6930E-04	-1,6538E-04
1,6	0,62658	0,23762	3,4517	0,930616	-4,2947E-05	3,0127E-05	-1,0992E-04	1,1116E-04
2	0,128467	0,7437	6,4484	0,262368	-2,3014E-05	7,0804E-05	-2,2045E-04	2,1919E-04
2,4	0,8736	0,35369	1,1212	1,349348	-2,1577E-05	-2,0541E-05	3,2249E-04	-3,1446E-04
2,8	0,7288	0,2496	2,1168	0,075537	7,6155E-06	9,5468E-05	-5,1003E-05	4,7379E-05
3,2	0,633473	0,34432	6,6656	1,387773	2,8345E-06	2,5868E-05	-2,0787E-04	2,0719E-04
3,6	0,40209	0,9682	2,3075	0,434801	-5,4298E-06	2,0429E-05	2,0654E-04	-2,0659E-04
4	0,12669	0,20911	0,9565	0,874533	-3,1672E-06	-1,4756E-05	-2,5491E-05	1,7106E-05

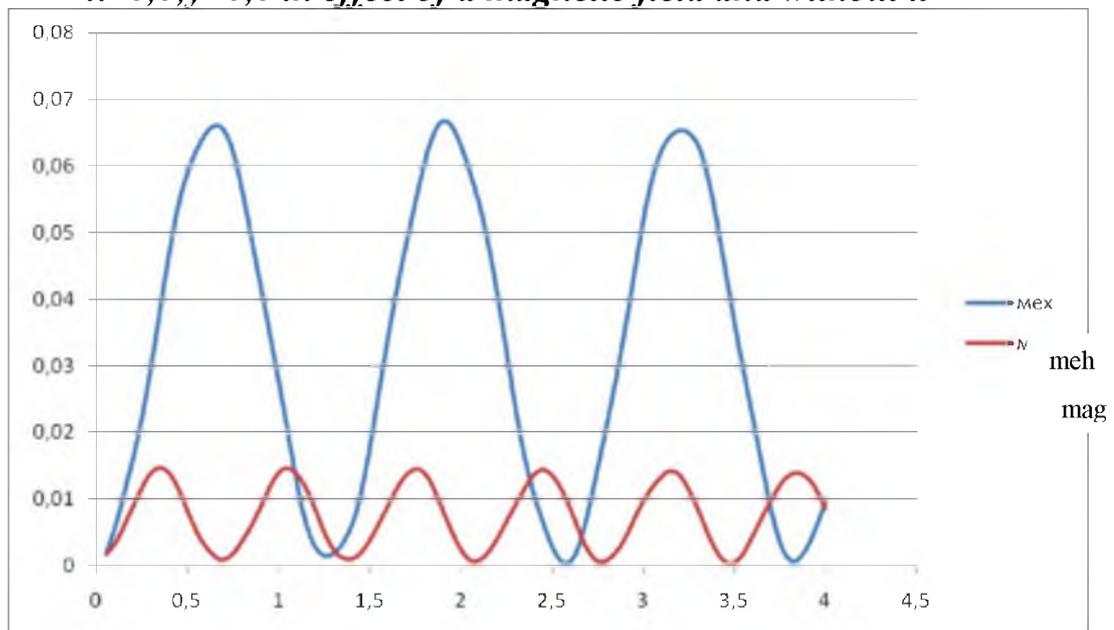
Variations of plate and behavior of components of electromagnetic field under simply supported boundary conditions

Further there are graphics of variations under effect of mechanical force and magnetic field on different locations. Pic. 1-2 show fluctuations of a rectangular plate

with rounded corners under effect of magnetic field at simply supported boundary conditions. In the center of plate there are much more deflections, and also higher frequency of fluctuations of plate.



Pic.1. Fluctuation of a rectangular plate with the rounded corners at point $x=0,0;y=0,0$ in effect of a magnetic field and without it

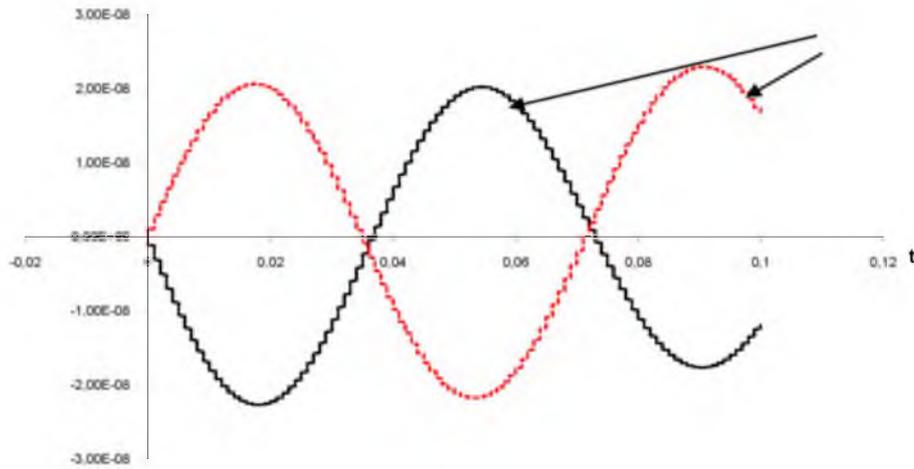


Pic.2. Fluctuation of a rectangular plate with the rounded corners at point $x=0,5;y=0,5$ in effect of a magnetic field and without it

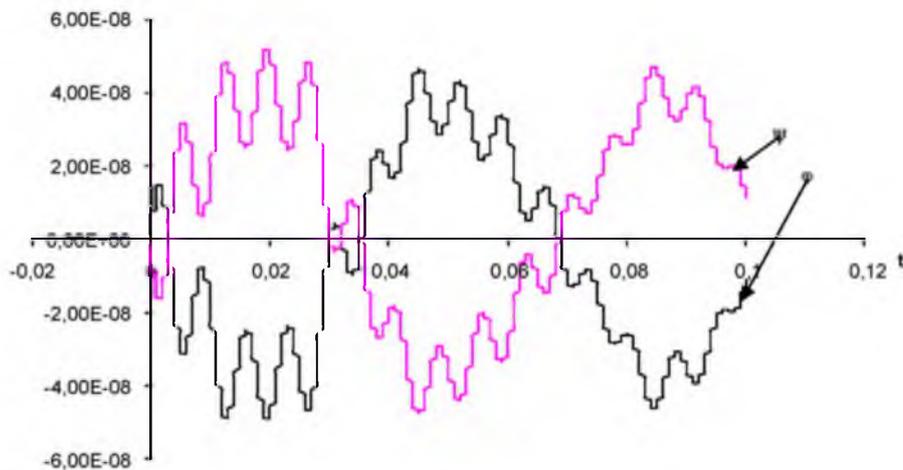
Pictures 3-4 shows research for components of the induced electromagnetic field φ, ψ at point $x=0,0$ $y=0,0$ ($x=0,5$ $y=0,5$) at a time interval $t=[0;4]$; $\Delta t= 0,04$ for area of a plate with rounded corners.

Here parameters of a magnetic field varies very quickly, has high frequencies and small amplitudes, a component of field φ opposite varies against a component of

field ψ .



Pic.3. Behaviour electromagnetic component at $\varphi(0,0;0,0;t)$ and $\psi(0,0;0,0;t)$ at free a boundary condition



Pic.4. Behaviour electromagnetic component at $\varphi(0,5;0,5;t)$ and $\psi(0,5;0,5;t)$ at free a boundary condition.

Conclusions:

1. A unified effective computational algorithm was developed for calculating the oscillations of a magnetoelastic thin plate with a complex configuration based on the R-functions, Bubnov-Galerkin methods and numerical methods.
2. On the basis of the developed algorithm and software, a computational experiment was conducted to solve new problems of oscillation of magnetoelastic thin plates of complex configuration.

References

1. Ambarsumyan S.A., Bagdasaryan G.E. Belubekyan M.V. To magnetoelasticity of thin environments and plates // PMM. -1973.t.37.-Release.1.-P. 115-130.
2. Landau L.D., Lifshits E.M. Electrodynamics of continuous environments. - M.:Gostehizdat, 1965. -532p.
3. Sedov L.I. The mechanics of continuous environment. T.I. -M.:Nauka, 1976. - 536p.
4. Tamm I.E. Bases of the theory of an electricity. -M.:Nauka, 1976. -616p.
5. Ambarsumyan S.A., Bagdasaryan G.E. Belubekyan M.V. To a three-dimensional task magnetoelasticity of fluctuations of a plate //PMM. -1971.t.35.- Release 2. -P.216-228.
6. Ambarsumyan S.A., Bagdasaryan G.E. Belubekyan M.V. About the equations magnetoelasticity of thin plates // PMM. -1975.T.39. - Release 5.-P.955-959.
7. Ambarsumyan S.A., Bagdasaryan G.E. Belubekyan M.V. Magnetoelasticity of thin environments and plates. -M.:Nauka, 1977. - 272 p.
8. Belubekyan M.V., Vardanyan L.V. About applicability of some approached methods in tasks of fluctuations electroconductivity of plates in a longitudinal magnetic field //Izvestya Academy NaukArmyanskoy SSR. Seriya.mehanika. -1977.t.XXX. -№6. -P. 4-52.
9. Ilin V.P. Numerical methods of the decision of tasks of electrophysics. - M.:Nauka,1985.-336p.

Rezyume. *Mazkur maqolada magnitoelastik masalasi qaralgan bo'lib, electromagnet maydonda joylashgan murakkab shalli yupqa plastinkalarning tebranish masalasi uchun hisoblash algoritmi ishlab chiqilgan va undan foydalangan holda plastinkaga elektromagnit maydonining ta'sir etish masalasi urganildi.*

Резюме *В данной статье рассмотрена разработка алгоритма расчета магнитоупругих тонких пластин со сложной формой на основе комбинации методов R-функций В.Л. Рвачева и вариационного метода Бубнова-Галеркина, автоматизирующий процесс колебания магнитоупругих тонких пластин со сложной формой. Решены задачи колебания магнитоупругих тонких пластин со сложной формой при наличии электромагнитного поля.*

Kalit so'zlar. *Matematik model, variatsiya, magnitelastik, plastinka, tebranish, Gamilton – Ostrogradskiy tamoili, Bubnov-Galerkin usuli, R-fuktsiya.*

Ключевые слова. *Математическая модель, вариация, магнитоупругость, пластинка, колебание, принцип Гамильтон – Остроградский, метод Бубнов-Галеркин, R-функция.*