Mem. Differential Equations Math. Phys. 12(1997), 3–10

ILIA VEKUA'S 90TH BIRTHDAY ANNIVERSARY

The outstanding Georgian mathematician Ilia Vekua was born on April 23, 1907 in village Shesheleti, West Georgia. After finishing a secondary school in the West-Georgian town of Zugdidi in 1925, he moved to Tbilisi, the capital of Georgia, where he entered the faculty of physics and mathematics of Tbilisi State University. He graduated the university with honours in 1930 and, following the recommendation of Academician Niko Muskhelishvili, left Tbilisi for Leningrad (now Sankt Petersburg) to continue his education there as a post-graduate student at the USSR Academy of Sciences. His initial research was conducted under the supervision of the well-known mathematician A. N. Krylov. In Leningrad Ilia Vekua published papers on problems of torsion and bending of elastic bars [1, 2]. He also worked on the theory of propagation of electric waves in an infinite layer with parallel plane boundaries [3] and obtained the results which subsequently formed the basis of his thesis for the Candidate of Science degree.

After finishing the post-graduate course in 1933, Ilia Vekua returned to Tbilisi to work at his alma mater. He wholly devoted himself to scientific, educational and organizational activities. Ilia Vekua became an active participant in the famous seminar run by Niko Muskhelishvili. He delivered lectures on mathematical physics, calculus of variations, differential and integral equations and was one of the enthusiastic founders of the Mathematical Institute of the Georgian Branch of the USSR Academy of Sciences (now A. Razmadze Mathematical Institute of the Georgian Academy of Sciences). Ilia Vekua became the first scientific secretary of this institute (1933–1940) and later its deputy director (1940–1941). Simultaneously with these duties, he headed the theoretical geophysics department at the Geophysics Institute of the Georgian Branch of the USSR Academy of Sciences. In 1939 he was granted the Doctor of Science degree and was elected a full professor of Tbilisi State University. In the course of many years Ilia Vekua held a number of posts at the above University; in particular, he was dean of the faculty of physics and mathematics (1940–1944), prorector (1944–1947), head of the chairs of geometry (1940–1947) and higher mathematics (1947–1953). In addition to this, he was head of the applied mathematics department at the Tbilisi Mathematical Institute (1943–1951), head of the theoretical mechanics chair at the Transcaucasian Institute of Means of Communication(1939–1946).

In 1944, Ilia Vekua was elected a corresponding member of the Georgian Academy of Sciences and two years later a corresponding member of the USSR Academy of Sciences and member of the Georgian Academy of Sciences. In the late 40s, Ilia Vekua headed the mathematics and natural science department (1947–1950) and was academician secretary (1947–1951) of the Georgian Academy of Sciences.

In 1951, Ilia Vekua moved to Moscow where he was officially invited for permanent residence and work. Together with his outstanding colleagues and friends M. A. Lavrent'ev, I. G. Petrovskiĭ and S. L. Sobolev, he directed the research seminars at V. A. Steklov Mathematical Institute and M. V. Lomonosov Moscow University. At various times, he was head of a department at N. E. Zhukovskiĭ Central Aerodynamical Institute (1951–1952), deputy director of the Institute of Precise Mechanics and Computer Hardware of the USSR Academy of Sciences (1952–1953), head of the theoretical mechanics chair at Moscow Institute of Physics and Engineering (1951–1954), professor of the differential equation, chair at Moscow University (1952–1959), deputy–director of V. A. Steklov Mathematical Institute of the USSR Academy of Sciences (1954), member of the bureau of the physics and mathematics department of the USSR Academy of Sciences (1954–1959). In 1958, Ilia Vekua was elected full member of the USSR Academy of Sciences and was granted the honorary title of academician.

Ilia Vekua was the first rector (1959–1964) of Novosibirsk University. When living in Siberia, Ilia Vekua simultaneously combined several duties: he headed the theoretical department at the Hydrodynamics Institute of the Siberian Branch of the USSR Academy of Sciences (1959–1961), the mathematical physics chair of Novosibirsk University (1959–1964), and supervised the work of several scientific seminars.

After the USSR National Commitee on Theoretical and Applied Mathematics was formed in 1956, Ilia Vekua had been its permanent member, while in 1963 he became member of the National Committee of Soviet Mathematicians.

At the end of 1964 Ilia Vekua returned to Tbilisi, where he was elected vice-president of the Georgian Academy of Sciences (1964–1965) and head of the higher mathematics chair at Tbilisi State University (1966–1972). On his initiative and under his guidance, the mechanics department was organized (1964) at A. Razmadze Tbilisi Mathematical Institute, while at Tbilisi State University the problem laboratory of applied mathematics was set up (1966) to be shortly reorganized into the Institute of Applied Mathematics (1968). The latter institute is named after Ilia Vekua as he was its founder and remained its director and scientific leader (1968–1977) till the last days of his life. Throughout 1972–1977, Ilia Vekua was the second president of the Georgian Academy of Sciences after its founder Academician Niko Muskhelishvili.

Ilia Vekua was a member of the Academy of Sciences of the German Democratic Republic (Berlin), the Academy of Natural Sciences "Leopoldina" (Halle), the Academy of Sciences of Literature and Art (Palermo, Sicilian Academy of Sciences), the Polish Society of Theoretical and Applied Mechanics, the Danish Center of Applied Mathematics and Mechanics. He was a member of the General Assembly of the International Union of Theoretical and Applied Mechanics (IUTAM). Ilia Vekua was granted the titles of Honorary Doctor of Halle University and Honorary Senator of Jena University.

Ilia Vekua's research works cover various fields of mathematics and mechanics. Many of them are devoted to the theory of partial differential equations in which Ilia Vekua took a great interest. In the analytical theory of linear differential equations of elliptic type with two independent variables, an important part was played by formulas of general representation of solutions by means of analytic functions of one complex variable [105]. These formulas made it possible to widen considerably the field of application of the methods of the classical theory of analytic functions of a complex variable. Based on these studies, Ilia Vekua developed new methods for solving boundary value problems which enabled him to investigate a vast class of boundary value problems formulated in nonclassical terms. The method he proposed for reducing boundary value problems to singular integral equations is one of the most powerful means for studies in this field. Special mention should be made of a general boundary value problem for elliptic equations, which Ilia Vekua formulated and studied most completely. The well known boundary value problems of Dirichlet, Neumann and Poincaré are particular cases of this problem. Ilia Vekua derived the formulas of integral representation of holomorphic functions, which in the mathematical literature are named after him, and used them as an important tool in investigating the problem. The results obtained by Ilia Vekua were presented in his monograph [51] which was awarded the Stalin Prize and, subsequently, published in English [105].

Ilia Vekua is one of the founders of the theory of generalized analytic functions. The results he obtained in this field were collected in his monograph [79] which won him the Lenin Prize and was published in English [91] and German [95].

Ilia Vekua worked out several versions of the mathematical theory of elastic shells. The results of these studies were presented in his monograph [123] which was posthumously awarded the State Prize. The published English version [124] of the monograph is also available.

In spite of his grave illness, Ilia Vekua continued to pursue his scientific, teaching and organizational activities till the last days of his life. His last monographs [122–123] were published posthumously. In September 1976, at Ilia Vekua's suggestion, the IUTAM's

General Assembly decided to hold the 3rd International Symposium on the Theory of Shells in Tbilisi, Georgia. Ilia Vekua was appointed chairman both of the international scientific committee and of the national organizing committee. Preparations for the symposium were underway when the whole scientific world was deeply saddened by the untimely demise of Ilia Vekua on December 2, 1977. The symposium which the IUTAM held in Tbilisi in August 22–28, 1978, was dedicated to the memory of Academician Ilia Vekua.

R. Gilbert, G. Jaiani, G. Manjavidze

List of Main Publications of I. Vekua

1. Problem of torsion of a circular cylinder reinforced with a longitudinal circular rod. (Russian) *Izv. Akad. Nauk SSSR, Otd. Mat. Estestv. Nauk, Ser.* 7(1933), No. 3, 373–386 (coauthor A. K. Rukhadze).

2. Torsion and bending by transverse force of a bar composed of two elastic materials bounded by confocal ellipses. (Russian) *Prikl. Mat. Mekh.* 1(1933), No. 2, 167–178 (coauthor A. K. Rukhadze).

3. Propagation of elastic waves in an infinite layer bounded by two parallel planes. (Russian) *Proc.* II *All-Union Math. Congr.* (*Leningrad, June* 24–30, 1934), (Russian) vol. 2, 363–364, *USSR Acad. Sci., Moscow-Leningrad*, 1936.

4. Sur une représentation complèxe de la solution générale des équations du problème stationnaire plan de la théorie de l'elasticité. *C. R. Acad. Sci. URSS*, 16(1937), No. 3, 155–160.

5. Sur la représentation générale des solutions de équations aux dérivées partielles du second ordre. *C. R. Acad. Sci. URSS*, 17(1937), No. 6, 295–299.

6. A general representation of solutions of partial differential equations of elliptic type which are linear with respect to the Laplace operator. (Russian) *Trudy Tbilis. Mat. Inst.* 2(1937), 227–240.

7. A boundary value problem of oscillation of an infinite layer. (Georgian) *Trudy Tbilis. Mat. Inst.* 1(1937), 141–164.

8. To the question of propagation of elastic waves in an infinite layer bounded by two parallel planes. (Russian) *Trudy Tbilis. Geophys. Inst.* 2(1937), 23–50.

9. Some remarks in connection with I. G. Kurdiani's paper "Some problems of stratification instability of air masses". (Russian) *Trudy Tbilis. Geophys. Inst.* 4(1939), 165–171.

10. A complex representation of solutions of elliptic differential equations and its application to boundary value problems. (Russian) *Trudy Tbilis. Mat. Inst.* 7(1939), 161-253.

11. Sur les équations intégrales linéaires singulières contenant des intégrales au sens de la valeur principale de Cauchy. *C. R. Acad. Sci. URSS*, 26(1940), No. 4, 327–330.

12. Boundary value problems of the theory of linear elliptic differential equations with two independent variables 1. (Russian) *Soobshch, Gruz. Fil. Akad. Nauk SSSR*, 1(1940), No. 1, 29–34.

13. Boundary value problems of the theory of linear elliptic differential equations with two independent variables 2. (Russian) *Soobshch. Gruz. Fil. Akad. Nauk SSSR*, 1(1940), No. 3, 181–186.

14. Boundary value problems of the theory of linear elliptic differential equations with two independent variables 3. (Russian) *Soobshch. Gruz. Fil. Akad. Nauk SSSR*, 1(1940), No. 7, 497–500.

15. Remarks in connection with the Fourier method. (Russian) *Soobshch. Gruz. Fil. Akad. Nauk SSSR*, 1(1940), No. 9, 647–650 (coauthor D. F. Kharazov).

16. An application of Academician N. Muskhelishvili's method to the solution of boundary value problems of the plane theory of elasticity of an anisotropic medium.

(Russian) *Soobshch. Gruz. Fil. Akad. Nauk SSSR*, 1(1940), No. 10, 719–724.

17. Allgemeine Darstellung der Lösungen elliptischer Differentialgleichungen in einem mehrfach zusammenhängenden Gebiet. *Soobshch. Fil. Akad. Nauk SSSR*, 1(1940), No. 5, 329–335.

18. On one new integral representation of analytic functions and its application. (Russian) *Soobshch. Akad. Nauk Gruz. SSR*, 2(1941), No. 6, 477–484.

19. On one class of singular integral equations with an integral in the sense of the Cauchy principal value. *Soobshch. Akad. Nauk Gruz. SSR*, 2(1941), No. 7, 579–586.

20. On reducing singular integral equations to the Fredholm equation. (Russian) *Soobshch. Akad. Nauk Gruz. SSR*, 2(1941), No. 8, 697–700.

21. On harmonic and metaharmonic functions in a space. (Russian) *Soobshch. Akad. Nauk Gruz. SSR*, 2(1941), No. 1, 20–32.

22. Supplement to the paper "On one new integral representation of analytic functions and its application". (Russian) *Soobshch. Akad. Nauk Gruz. SSR*, 2(1941), No. 8, 701–706.

23. Integral equations with a singular kernel of the Cauchy type. (Russian) *Trudy Tbilis. Mat. Inst.* 10(1941), 45–72.

24. Über harmonische und metaharmonische Funktionen im Raum. *Soobshch. Akad. Nauk Gruz. SSR*, 2(1941), No. 1–2, 29–34.

25. On the approximation of solutions of elliptic differential equations. (Russian) *Soobshch. Akad. Nauk. Gruz. SSR*, 3(1942), No. 2, 97–102.

26. Solution of the basic boundary value problem for the equation $\Delta^{n+1}u = 0$. (Russian) *Soobshch. Akad. Nauk Gruz. SSR*, 3(1942), 213–220.

27. On solutions of equation $\Delta u + \lambda^2 u = 0$. (Georgian) *Soobshch. Akad. Nauk Gruz. SSR*, 3(1942), No. 4, 307–314.

28. On the bending of a plate with a free edge. (Russian) *Soobshch. Akad. Nauk Gruz. SSR*, 3(1942), No. 7, 641–648.

29. To the theory of singular integral equations. (Russian) *Soobshch. Akad. Nauk Gruz. SSR*, 3(1942), No. 9, 869–876.

30. On one linear boundary value problem of Riemann. (Russian) *Trudy Tbilis. Mat. Inst.* 11(1942), 109–139.

31. On the solution of a mixed boundary value problem of the theory of a Newtonian potential for a multiply connected domain. (Russian) *Soobshch. Akad. Nauk Gruz. SSR*, 3(1942), 753–758.

32. Geen's function for a spherical layer. (Georgian) *Trudy Tbilis. Gosud. Univ.* 25(1942), 225–228.

33. On some basic properties of metaharmonic functions. (Russian) *Soobshch. Akad. Nauk Gruz. SSR*, 4(1943), No. 4, 281–288.

34. Remarks on a general representation of solutions of differential equations of elliptic type. (Russian) *Soobshch. Akad. Nauk Gruz. SSR*, 4(1943), No. 5, 385–392.

35. To a general diffraction problem. (Russian) *Soobshch. Akad. Nauk Gruz. SSR*, 4(1943), No. 6, 503–506.

36. On one integral representation of solutions of differential equations. (Russian, Georgian) *Soobshch. Akad. Nauk Gruz. SSR*, 4(1943), No. 9, 843–852.

37. On one new representation of solutions of differential equations. (Georgian) *Soobshch. Akad. Nauk Gruz. SSR*, 4(1943), No. 10, 941–950.

38. On metaharmonic functions. (Russian) *Trudy Tbilis. Mat. Inst.* 12(1943), 105–174.

39. Correction to Ilia Vekua's paper "On one linear boundary value problem of Riemann". (Russian) (*see Trudy Tbil. Mat. Inst.* 11(1942), 109–139). *Trudy Tbilis. Math. Inst.* 12(1943), 215.

40. Sur certain dévelopment des fonctions métaharmoniques. *C. R. Acad. Sci. URSS*, 48(1945), No. 1, 3–6.

41. Représentation genérale des solutions dúne équation différentielle des fonctions sphériques. *C. R. Acad. Sci. URSS*, 49(1945), No. 5, 311–314a.

42. Inversion of one integral transformation and some of its applications. (Russian) *Soobshch. Akad. Nauk Gruz. SSR*, 6(1945), No. 3, 179–183.

43. On the integrodifferential equation of Prandtl. (Russian) *Prikl. Mat. Mekh.* 9(1945), No. 2, 143–150.

44. Integration of equations of a spherical shell. (Russian) *Prikl. Mat. Mekh.* 9(1945), No. 5, 368–388.

45. To the theory of Legendre's functions. (Russian) *Soobshch. Akad. Nauk Gruz. SSR*, 7(1946), No. 1–2, 3–10.

46. To the theory of cylindrical functions. (Russian) *Soobshch. Akad. Nauk Gruz. SSR*, 7(1946), No. 3, 95–101.

47. Sur une généralisation de lı́ntégrale de Poisson pour le demi-plan. *C. R. Acad. Sci. URSS*, 56(1947), No. 3, 229–231.

48. Some basic problems of the theory of a thin spherical shell. (Russian) *Prikl. Mat. Mekh.* 11(1947), No. 5, 499–516.

49. Approximation of solutions of second order differential equations of elliptic type. (Georgian) *Trudy Tbilis. Gos. Univ.* 30a(1947), 1–21.

50. On one generalization of the Poisson integral for a half-plane. (Georgian) *Trudy Tbilis. Mat. Inst.* 15(1947), 149–154.

51. New methods of solution of elliptic equations. (Russian) *Gostekhizdat, Moscow–Leningrad,* 1948, 296 p.

52. On one method of solution of boundary value problems of sinusoidal oscillation of an elastic cylinder. (Russian) *Dokl. Akad. Nauk SSSR*, 60(1948), No. 5, 779–782.

53. To the theory of shallow thin elastic shells. (Russian) *Prikl. Mat. Mekh.* 12(1948), No. 1, 69–74.

54. To the theory of elastic shells. (Russian) *Dokl. Akad. Nauk SSSR*, 68(1949), No. 3, 453–455.

55. On one representation of solutions of differential equations of elliptic type. (Russian) *Soobshch. Akad. Nauk Gruz. SSR*, 11(1950), No. 3, 137–141.

56. On the proof of some uniquness theorem occurring in the stationary oscillation theory. (Russian) *Dokl. Akad. Nauk SSSR*, 80(1951), No. 3, 341–343.

57. Systems of first order differential equations of elliptic type and boundary value problems with an application in the shell theory. (Russian) *Mat. Sb.* 31(1952), No. 2, 217–314.

58. A general representation of functions of two independent variables admitting derivatives in the Sobolev sense and the problem of primitives. (Russian) *Dokl. Akad. Nauk SSSR*, 89(1953), No. 5, 773–775.

59. On the completeness of a system of harmonic polynomials in a space. (Russian) *Dokl. Akad. Nauk SSSR*, 90(1953), No. 4, 495–498.

60. On the completeness of a system of metaharmonic functions. (Russian) *Dokl. Akad. Nauk SSSR*, 90(1953), No. 5, 715–718.

61. A boundary value problem with an oblique derivative for an elliptic type equation. (Russian) *Dokl. Akad. Nauk SSSR*, 92(1953), No. 6, 1113–1116.

62. On one property of the solution of a generalized system of Cauchy–Riemann equations. (Russian) *Soobshch. Akad. Nauk Gruz. SSR*, 14 (1953), No. 8, 449–453.

63. On some properties of solution s of a system of elliptic type equations. (Russian) *Dokl. Akad. Nauk SSSR*, 98(1954), No. 2, 181–184.

64. On the solution of boundary value problems of the shell theory. (Russian) *Soobshch. Akad. Nauk GSSR*, 15(1954), No. 1,3–6.

65. Problem of reducing differential equations of elliptic type to the canonical form and the generalized Cauchy-Riemann system. (Russian) *Dokl. Akad. Nauk SSSR*, 100(1955), No. 2, 197–200.

66. On one method of solution of boundary value problems of partial differential equations. (Russian) *Dokl. Akad. Nauk SSSR*, 101(1955), No. 4, 593–596.

67. On one method of calculating of prismatic shells. (Russian) *Trudy Tbilis. Mat. Inst.* 21(1955), 191–259.

68. Systeme von Differentialgleichungen erster Ordnung vom elliptischen Typus und Randwertaufgaben mit einer Anwendung in der Theorie der Schalen. *Deutscher Verlag. Wiss.*, 1956, p. 107.

69. Theory of generalized analytic functions and its applications in geometry and mechanics. (Russian) III *All-Union Math. Congr.*, (*Moscow, June–July*, 1956), *Abstracts of survey and section reports*, (Russian) 9–11, *Moscow, Izd. Akad. Nauk SSSR*, 1956.

70. On some rigidity conditions for surfaces of positive curvature. (Russian) *Delivered at the* IV *Congress of Czechoslovak mathematicians in Prague*, 6.IX. 1955. *Czech. Math. J.* 6(1956), No. 2, 143–160.

71. Some problems of infinitesimal bendings of surfaces. (Russian) *Dokl. Akad. Nauk SSSR*, 112(1957), No. 3, 377–380.

72. Civeta probleme ale teoriei functilor analitice generalizate si ale aplicatülor ei in geometrie i mecanica. *Bull. Math. Soc. Sci. Mat. Fiz. R.P.Roumanie*, 1(1957), No. 2, 229–243.

73. Theorie of generalized analytic functions and some of its applications in geometry and mechanics. (Russian) *Proc.* III *All-Union Math. Congr.* (*Moscow, June–July*, 1956) (Russian), v. 3, Survey reports, 42–64, *Izd. Akad. Nauk SSSR, Moscow*, 1958.

74. Über die korrekte Stellung der Riemann – Hilbertschen Aufgabe. *Proc. Intern. Colloq. on Theory of Functions. Ann. Acad, Sci. Fenn., ser. A.* 1(1958), p. 14.

75. Proof of the rigidity of piecewise-regular closed convex surfaces of non-negative curvature. (Russian) *Izv. Akad. Nauk SSSR. Ser. Math.* 22(1958), No. 2, 165–176 (coauthor B. V. Boyarski).

76. On the conditions providing a momentless stressed state of equilibrium of the convex shell. (Russian) *Soobshch. Akad. Nauk Gruz. SSR*, 20(1958), No. 5, 525–532.

77. On the conditions of a momentless stressed state of convex shells. (Russian) *Soobshch. Akad. Nauk Gruz. SSR*, 21(1958), No. 6, 649–652.

78. On the conditions for realizing a momentless stressed equilitrium state of convex shells. (Russian) *Steklov Mat. Inst. Akad. Nauk SSSR, Moscow*, 1958, 23 p.

79. Generalized analytic functions. (Russian) *Fizmatgiz, Moscow*, 1959, 628 p.

80. Systems of first order differential equations of elliptic type and boundary value problems with an application to the shell theory. (Chinese) *Peking, Gao den tsiya-o-yu chuban-she*, 1960, VII , 204 p.

81. On the conditions of momentless stressed equilibrium state of a convex shell. (Russian) *Proc. All-Union Conf. on Diff. Equations* (*Yerevan, November*, 1958) (Russian), 32–44, *Izd. Akad. Nauk Arm. SSR, Yerevan*, 1960.

82. Über die Bedingungen der Verwirklichung des momentenfreien Spannungsleichgewichtes von Schalen positiver Krümmung,*Proceedings of the symposium on the theory of thin elastic shells. North-Holland Publ. Co., Amsterdam*, 1960, 270–280.

83. A remark on the properties of solutions of equations $\Delta u = -2ke^u$. (Russian) *Sibirsk. Mat. Zh.* 1(1960), No. 3, 331–342.

84. Academician N.I. Muskhelishvili. Brief biography and a survey of scientific papers. (Russian) *, Akad. Nauk SSSR, Novosibirsk*, 1961, 55 p.

85. Academician N. Muskhelishvili. (Georgian) *Tbilisi*, 1961, 61 p.

86. Projective properties of force and deflection fields. (Russian) *Problems of Mechanics of Continua. To the 70th birthday anniversary of Academician N. I. Muskhelishvili* (Russian), 83–91, *Izd. Akad. Nauk SSSR, Moscow*, 1961.

87. A projective property of force and deflection fields. *Problems of continuum mechanics*, 582–591, *Philadelphia*, 1961.

88. On some properties of solutions of the Gauss equation. (Russian) *Trudy Mat. Inst. Steklov.* 64(1961), 5–8.

89. To the theory of quasiconformal mappings. (Russian) *Some problems of mathematics and mechanics* (Russian), 57–64, *Izd. Akad. Nauk SSSR, Novosibirsk*, 1961.

90. On the compactness of a family of generalized analytic functions. (Russian) Trudy Tbilis. Univ. Ser. mech.-math. sci., 1961, 17–21.

91. Generalized analytic functions. *Oxford–London–New York–Paris*, 1962, 668 p.

92. Methods of the theory of analytic functions in the theory of elasticity. (Russian) *Proc. All-Union Congr. on Theoretical and Applied Mechanics* (*January* 27–*February* 3, 1960). *Survey Reports, Izd. Akad. Nauk SSSR, Moscow–Leningrad*, 1962, 310–338 (coauthor N. I. Muskhelishvili).

93. Fixed singular points of generalized analytic functions. (Russian) *Dokl. Akad. Nauk SSSR*, 145(1962), No. 1, 24–26.

94. Equations and systems of equations of elliptic type. (Russian) *Proc.* IV *All-Union Math. Congr.* (Russian) v. 1, 29–48, 1963.

95. Verallgemeinerte analytische Funktionen. *Berlin, Akad. Verlag*, 1963, 538 p.

96. On a version of the theory of shallow thin shells. (Russian) *Izd. Novosib. Gos. Univ., Novosibirsk,* 1964, 68 p.

97. Theory of thin and shallow shells of varying thickness. (Russian) *Izd. Novosib. Gos. Univ., Novosibirsk,* 1964, 39 p.

98. Fundamentals of tensor analysis. (Russian) *Izd. Novosib. Gos. Univ., Novosibirsk*, 1964, 138 p.

99. On a version of the bending theory of elastic shells. *Univ. Maryland, USA*, 1964, 42 p.

100. New methods in mathematical shell theory.*Proc.* XI *Intern. Congr. Appl. Mech. Munich*, 47–58, *Springer–Verlag*, 1964.

101. Theory of thin and shallow elastic shells with variable thickness. (Russian) *Appplications of the theory of functions in continuum mechanics* (Russian), v. 1, 410–431, *Nauka, Moscow,* 1965.

102. Theory of thin shallow shells of variable thickness. (Russian) *Trudy Tbilis. Mat. Inst. Razmadze*, 30(1965), 5–103.

103. Fundamentals of tensor analysis. (Russian) *Tbilisi University Press, Tbilisi*, 1967, 137 p.

104. Über eine Verallgemeinerung der Biegetheorie der Schalen. *Intern. Kongr. Anwendungen der Mathematik in Ingenieurwiss. mit Rahmenthema, Anwendungen elektronischer Rechenanlagen im Bauwesen, Bd.* 1(1967), 260–280.

105. New methods for solving elliptic equations. *North-Holland Publ. Co., Amsterdam*, 1967.

106. On construction of an approximate solution of the equation of a shallow spherical shell. *Intern. J. Solids Struct.* 10(1968), 991–1003.

107. On conformal invariant differential forms in shell theory. *Functional theoretical methods in partial differential equations,* 303–311, *Acad. Press*, 1968.

108. On one version of the consistent theory of elastic shells. *IUTAM Symp.* (*Copenhagen*, 1967), 59–84, *Springer-Verlag, Berlin–Heidelberg–New York*, 1969.

109. On the integration of a system of equations of an elastic equilibrium of a plate. (Russian) *Dokl. Akad. Nauk SSSR*, 186(1969), No. 3, 541–544.

110. On the integration of equilibrium equations of a cylindrical shell. (Russian) *Dokl. Akad. Nauk SSSR*, 186(1969), No. 4, 787–790.

111. On one class of an irregular elliptic system of first order equations. (Russian) *Abstracts of reports of the Seminar of Inst. Appl. Math. Tbilis. State Univ.* 1(1969), 5–9.

112. On one class of elliptic systems with singularities. *Proc. Intern. Conf. on Functional Analysis and Related Topics, Tokyo,* 1969, 142–147.

113. Variational principles of construction of the shell theory. (Russian) *Tbilisi University Press, Tbilisi*, 1970, 17 p.

114. On one method of solving of the basic biharmonic boundary value problem and the Dirichlet problem. (Russian) *Some problems of mathematics and mechanics* (Russian), 120–127, *Leningrad*, 1970.

115. Equations of thin elastic shells. (Russian) *Abstracts of reports Inst. Appl. Math. Tbilis. State Univ.* 5(1971) 69–75.

116. On one trend of construction of shell theory. (Russian) *Mechanics in the USSR for* 50 *years*, (Russian) 3, 267–290, *Nauka, Moscow*, 1972.

117. On two ways of constructing the theory of elastic shells. *Proc.* XIII *Intern. Congr. Theoret. and Appl. Mech.*, (*Moscow*), 1972, 322-339, *Springer–Verlag, Berlin–Heidelberg–New York,* 1973.

118. On a functional equation of the theory of minimal surfaces. (Russian) *Dokl. Akad. Nauk SSSR*, 217(1974), No. 5, 997–1000.

119. On two ways of constructing a noncontradictory theory of elastic shells. (Russian) *Proc.* I *All-Union School on the Theory and Numerical Methods of Calculation of Shells and Plates,* (*Gegechkori*), (Russian) 5–10, *Metsniereba, Tbilisi*, 1975.

120. On one method of solving the first biharmonic boundary value problem and the Dirichlet problem. *J. Amer. Math. Soc.* 104(1976), 104–111.

121. On one class of statically definable problems of shell theory (Russian). *Soobshch. Akad. Nauk Gruz. SSR*, 83(1976), No. 2, 273–276; No. 3, 529–532.

122. Fundamentals of tensor analysis and theory of covariants. (Russian) *Nauka, Moscow*, 1978, 296 p.

123. Some general methods of constructing various versions of shell theory. (Russian) *Nauka, Moscow*, 286 p.

124. Shell theory: general methods of construction. *Pitman Advanced Publishing Program, Boston–London–Melbourne,* 1985, 287 p.

125. Academician N. Muskhelishvili. *Transl. from Georgian, Ed. By G. Manjavidze, Tbilisi, Metsniereba*, 1991, 60 p.