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Tengiz Gegelia

(1928–1994)

Tengiz Gegelia was born in a village called Patara Jikhaishi near the city of Kutaisi. In 1945 graduated from a secondary school and the same year entered the Faculty of Physics and Mathematics of Tbilisi State University. After completing his university education in 1950, Tengiz Gegelia began to work at the Chair of Mathematics and Mechanics of Tbilisi State University.

In 1956–1966 Gegelia worked at A. Razmadze Mathematical Institute. In 1966 he headed the Mathematic Department of Continuum Mechanics of Institute of Applied Mathematics. In 1980 this department moved to A. Razmadze Mathematical Institute and Tengiz Gegelia was at its head until his death in 1994.

Tengiz Gegelia's mathematical activity covered several fundamental areas. His first papers published in 1952–1954 dealt with one-dimensional

singular integral operators on nonsmooth curves. The results he obtained then formed the basis of his Ph.D. thesis.

In 1955–1963 Tengiz Gegelia published a series of papers on multidimensional singular integral operators which gained general acceptance of specialists. He investigated differential properties of functions represented by singular integrals as well as of solutions of the corresponding singular integral equations. He also considered singular potentials in various spaces of smooth functions. These papers made a fundamental contribution to the investigation of boundary value problems of elasticity. Victor Kupradze and he were the first scientists who investigated thoroughly the solvability of the system of boundary integral equations corresponding to the Neumann boundary value problem of elasticity (when the stress vector is given on the boundary). Their results significantly stimulated application of the potential method and the theory of singular integral equations to investigation of three-dimensional problems of elasticity. It suffices to mention the well-known monographs "Three-dimensional Problems of the Mathematical Theory of Elasticity and Thermoelasticity" by V. Kupradze, T. Gegelia, M. Basheleishvili, and T. Burchuladze and "Development of the Potential Method in the Theory of Elasticity" by T. Burchuladze and T. Gegelia.

Another area to which Tengiz Gegelia contributed was that of study of numerical solution of problems of mathematical physics. Under his guidance a set of algorithms for solution of boundary value and boundary-contact problems of elasticity was developed and put into practice.

Among the last works of Tengiz Gegelia are papers written in collaboration with T. Buchukuri on the asymptotic behaviour of solutions of various systems of elasticity in the neighbourhood of isolated singular points, as well as two monographs. The first monograph is written in co-authorship with R. Chichinadze and is dedicated to solution of the basic problems of elasticity for a sphere in the form of quadratures. The second one written jointly with T. Buchukuri is related to boundary value problems of electroelasticity.

Tengiz Gegelia gained authority among specialists in the theory of differential equations and mechanics. He was always attentive to his colleagues and possessed a gift of foreseeing a basic ideas of new research.

Prof. Tengiz Gegelia was a remarkable teacher and a brilliant lecturer. Since 1967 he was Professor of Tbilisi State University. He was Head of the Chair of Theoretical Mechanics of Tbilisi State University in 1966-1972. In 1980-1994 he was Head of the Chair of Differential and Integral Equations of Tbilisi State University and was delivering a splendid lecture course on equations of mathematical physics. In spite of constant intensive work, he yet managed to find time for teaching at a mathematical secondary school. Tengiz Gegelia was the author of many original textbooks for university and secondary school curricula. He showed interest in teaching mathematics and was regarded as a commonly acknowledged authority in this field.

Tengiz Gegelia lived an eventful life, He was fond of hunting and fishing, went in for bee-keeping, and spent much time at his farmstead in a picturesque mountainous village of Georgia. He was not only a distinguished mathematician, but also a person of exceptional nobility. He helped much and eagerly the people who surrounded him. He treated his pupils and colleagues like members of his own family. He had an ability of consolidating people around him, felt at ease in any society yet preserving his own individuality. All these qualities left a lasting impression even on those who seldom had occasion to meet this remarkable man personally, still more on his pupils and associates.

T. Buchukuri

List of Main Publications

(i) Monographs

1. Three-dimensional Problems of the Mathematical Theory of Elasticity (with V. D. Kupradze, M. O. Basheleishvili, T. V. Burchuladze). (Russian) *Izdat. Tbilis. Univ., Tbilisi,* 1968, 627 pp.
2. Wybrane zagadnienia teorii sprezystosci i termosprezystosci (With V. D. Kupradze, M. O. Basheleishvili, T. V. Burchuladze). *Zaklad. Narodowy Imienia Ossolinkich Wydawnictwe PolskejAkademij Nauk, Warszawa,* 1970.
3. Three-dimensional Problems of the Mathematical Theory of Elasticity and Thermoelasticity (with V. D. Kupradze, M. O. Basheleishvili, T. V. Burchuladze). (Russian) *Nauka, Moscow,* 1976, 663 pp.
4. Three-dimensional Problems of the Mathematical Theory of Elasticity and Thermoelasticity (with V. D. Kupradze, M. O. Basheleishvili, T. V. Burchuladze). Translated from the second Russian edition. Edited by V. D. Kupradze. *North-Holland Series in Applied Mathematics and Mechanics,* 25. *North-Holland Publishing Co., Amsterdam-New York,* 1979, 929 pp.
5. Development of the potential method in elasticity theory (with T. Burchuladze). (Russian) *Trudy Tbiliss. Mat. Inst. Razmadze Akad. Nauk Gruzin. SSR* **79** (1985), 226 pp.

(ii) Papers

6. on some singular integral equations of particular form. (Russian) *Soobshch. Akad. Nauk Gruzin. SSR* **13** (1952), 581-586.
7. Hilbert's boundary value problem and singular integral equations in the case of intersecting contours. (Russian) *Soobshch. Akad. Nauk Gruzin. SSR* **15** (1954), 69-76.
8. On boundary values of Cauchy type integrals for unsmooth surfaces. (Russian) *Soobshch. Akad. Nauk Gruzin. SSR* **15** (1954), 481-488.
9. on a generalization of G. Giraud's theorem. (Russian) *Soobshch. Akad. Nauk Gruzin. SSR* **16** (1955), 657-663.
10. On properties of certain classes of continuous functions under a Hilbert transformation in E^n. (Russian) *Soobshch. Akad. Nauk Gruzin. SSR.* **19** (1957), no. 3, 257–261.
11. The fundamental lemma of I. I. Privalov for space potentials. (Russian) *Soobshch. Akad. Nauk Gruzin. SSR* **18** (1957), 257–264.

12. Boundedness of singular operators. (Russian) *Soobshch. Akad. Nauk Gruzin. SSR* **20** (1958), 517-523.
13. Behavior of a generalized potential near the boundary of the region of integration. (Russian) *Trudy Tbiliss. Mat. Inst. Razmadze* **26** (1959), 189-193.
14. Differential properties of some integral transforms. (Russian) *Trudy Tbiliss. Mat. Inst. Razmadze* **26** (1959), 195–225.
15. Composition of singular kernels. (Russian) *Dokl. Akad. Nauk SSSR* **135** (1960), 767–770; English transl.: *Soviet Math. Dokl.* **1** (1960), 1299–1302.
16. Properties of n-dimensional singular integrals in the space $L_p(S;\,\rho)$. (Russian) *Dokl. Akad. Nauk SSSR* **139** (1961), 279–282.
17. Integral equations containing integrals taken over a surface with edges. (Russian) *Dokl. Akad. Nauk SSSR* **141** (1961), 773–776.
18. On the boundary values of functions of potential type. (Russian) *Trudy Vychisl. Centra Akad. Nauk Gruzin. SSR* **2** (1961), 285–313 (1962).
19. On the formula for the change of order of integration in iterated singular integrals. (Russian) *Trudy Tbiliss. Mat. Inst. Razmadze* **28** (1962), 41–52.
20. Some fundamental boundary-value problems in elasticity theory in space. (Russian) *Trudy Tbiliss. Mat. Inst. Razmadze* **28** (1962), 53–72.
21. Differentiability properites of solutions of singular surface integral equations. (Russian) *Gruzin. Politehn. Inst. Trudy* **1962**, no. 1 (81), 69–78.
22. On the regularization of singular integral operators. (Russian) *Trudy Tbiliss. Mat. Inst. Razmadze* **29** (1963), 229–237 (1964).
23. On an inversion formula of A. Bicadze. (Russian) *Trudy Vychisl. Centra Akad. Nauk Gruzin. SSR* **3** (1963), 81–87.
24. On the fundamental three-dimensional boundary-value problems for composite isotropic elastic media (with M. O. Basheleishvili). (Russian) *Dokl. Akad. Nauk SSSR* **160** (1965), 50–53.
25. On a certain property of solutions of singular integral equations. (Russian) *Trudy Tbiliss. Gos. Univ. Ser. Mekh. Math.* **110** (1965), 43–56.
26. Certain special classes of functions and their properties. (Russian) *Trudy Tbiliss. Mat. Inst. Razmadze* **32** (1967), 94–139.
27. Certain boundary problems of the moment theory of elasticity (with M. O. Basheleishvili and O. I. Maisaia). (Russian) *Annot. Dokl. Sem. Inst. Prikl. Mat. I. N. Vekua* **1** (1970), 43-54.
28. On the axiomatic theory of the elastic state (with O. I. Maisaia). (Russian) *Annot. Dokl. Sem. Inst. Prikl. Mat. I. N. Vekua* **3** (1970), 33-39.
29. Investigation of the basic dynamic problems of the theory of elasticity for infinite domains. (Russian) In: *Continuum Mechanics and Related Problems of Analysis. To the 80th Birthday Anniversary of N. I. Muskhelishvili, Nauka, Moscow,* 1972.
30. A study of the third and the fourth three-dimensional boundary value problems of the statics of an isotropic elastic body (with M. O. Basheleishvili). (Russian) *Tbiliss. Gos. Univ. Inst. Prikl. Mat. Trudy* **3** (1972), 29-67.
31. A system of two-dimensional singular integral equations. (Russian) *Tbiliss. Gos. Univ. Inst. Prikl. Mat. Trudy* **3** (1972), 69-72.
32. A study of certain boundary value problems of a micropolar medium (with R. K. Chichinadze). (Russian) *Annot. Dokl. Sem. Inst. Prikl. Mat. I. N. Vekua* **9** (1974), 15–19.
33. Existence theorems for the solutions of the fundamental problems of the dynamics of inhomogeneous, anisotropic, unbounded elastic media (with O. I. Maisaia). (Russian) *Dokl. Akad. Nauk SSSR* **224** (1975), no. 6, 1290–1292.
34. Basic static problems of elastic micropolar-media (with R. K. Chichinadze). *Arch. Mech. (Arch. Mech. Stos.)* **28** (1976), no. 1, 89–104.
35. On the stability of solutions of the basic problems of the elasticity theory. (Russian) In: *Teoretichna I Prilozhna Mekhanika, Sofia,* 1977, 62-69.

36. Some boundary value problems for micropolar media that are bounded by several surfaces (with R. K. Chichinadze). (Russian) *Investigations of some problems in thermoelasticity theory and moment elasticity theory* (Russian), pp. 3–32. *Tbilis. Gos. Univ. Inst. Prikl. Mat., Tbilisi,* 1977.
37. On the investigation and approximate solution of the fundamental inhomogeneous boundary value problems for the inhomogeneous equation of elasticity. (Russian) *Tbiliss. Gos. Univ. Inst. Prikl. Mat. Trudy* 5/6 (1978), 93–100.
38. Fundamental mathematical problems of the dynamical state of an elastic unbounded medium (with O. I. Maisaia). (Russian) *Complex analysis and its applications* (Russian), pp. 151–159, *Nauka, Moscow,* 1978.
39. An algorithm of approximate calculation of potential-type singular integrals and their applications (with T. Zviadadze). *Springer Verlag,* 1979.
40. Randaufgaben der Elastizitatstheorie mit Beruckichtigung der Ubertragung. 7 Tagung Ueber probleme und methoden der Mathematischen Physik. Technische Hochschule, Karl-Marks-Stadt, 1979. 40.
41. Integral equations (with B. V. Khvedelidze, M. I. Imanaliev, A. A. Babaev, A. I. Batashev). (Russian) *Differentsial'nye Uravneniya* **18** (1982), No. 12, 2050-2069.
42. Numerical solutions of the basic problems of elasticity theory by the method of singular integral equations. (Russian) *Trudy Tbiliss. Mat. Inst. Razmadze* **73** (1983), 45–54.
43. Investigation of boundary value problems of a viscous incompressible micropolar fluid (with R. K. Chichinadze). (Russian) *Soobshch. Akad. Nauk Gruzin. SSR* **110** (1983), No. 3, 485-488.
44. Potential methods in the theory of elasticity. (Russian) *Differentsial'nye Uravneniya* **20** (1984), no. 9, 1475–1488.
45. The character of the isolated singularities of the solutions of a system of equations of elasticity theory (with T. V. Buchukuri). (Russian) *Soobshch. Akad. Nauk Gruzin. SSR* 125 (1987), no. 3, 501–504.
46. Asymptotic behavior of solutions of fundamental equations of statics in elasticity theory near isolated singular points and at infinity, and its applications (with T. V. Buchukuri). (Russian) *Current problems in mathematical physics,* Vol. II (Russian) (*Tbilisi,* 1987), 169–179, 386–387, *Tbilis. Gos. Univ., Tbilisi,* 1987.
47. Qualitative properties of solutions of the fundamental equations of the theory of elasticity near singular points (with T. Buchukuri). Russian) *Trudy Tbiliss. Mat. Inst. Razmadze* **90** (1988), 40–67.
48. Solution in quadratures of the basic problems of thermoelasticity for a sphere and a spherical cavity (with R. K. Chichinadze). *Z. Anal. Anwendungen* **8** (1989), no. 6, 515–536.
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50. Boundary value problems in elasticity theory with concentrated singularities (with T. V. Buchukuri). (Russian) *Differentsial'nye Uravneniya* **25** (1989), no. 10, 1746–1755; English transl.: *Differential Equations* **25** (1989), no. 10, 1226–1234 (1990).
51. On the uniqueness theorems for the external problems of the couple-stress theory of elasticity (with T. Buchukuri). *Georgian Math. J.* **1** (1994), No. 2, 127-140.
52. Potential methods in continuum mechanics (with L. Jentsch). *Georgian Math. J.* **1** (1994), no. 6, 599–640.
53. Uniqueness theorems in linear theory of microporous solids (with L. Jentsch). *Z. Anal. Anwendungen* **13** (1994), no. 1, 73–82.
54. Boundary value problems of mechanics of continuum media for a sphere (with R. Chichinadze). *Mem. Differential Equations Math. Phys.* **7** (1996), 1–222.

55. Some dynamic problems of the theory of electroelasticity (with T. Buchukuri). *Mem. Differential Equations Math. Phys.* **10** (1997), 1–53.