Theory of Elastic Thin Shells

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Columbia University · New York

Pergamon Press

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Professor Aleksei L'vovich Gol'denveizer (1911 – 2003)

Biography (from J. Appl. Maths Mechs, Vol. 67, No. 3, pp 469-470, 2003):

Aleksei Uvovich Gol'denveizer, the great Russian scientist in the held of applied mathematics and mechanics, and founder of the modern mathematical theory of shells, has passed away. He was born on 12 January 1911 in Moscow. In 1931 he graduated from the Physics and Mathematics Department of Moscow State University, and from 1930 to 1941 he worked in the Narkomstroi Central Scientific Institute of Industrial Buildings. In 1941 he was called up for military service. In 1942-1952 he worked in aviation institutes (TsAGI and TsIAM). In 1943 he gained a Master's degree in the technical sciences, and in 1949 a Doctor's degree in physics and mathematics. In 1947-1952, he taught at the Moscow Institute of Physics and Technology, and in 1952-1960 he was Head of the Department of Higher Mathematics at the All-Union Correspondence Construction Engineering Institute. In 1959 he began work in the Academy of Sciences, which he continued until the last days of his life. From 1960 he was Head of the Department of the Theory of Shells at the Institute of Mechanics, and from 1965 he worked at the Institute of Problems of Mechanics, where for many years he headed the Department of Elasticity Theory, and in recent years he was a senior research fellow. He was a member of the National Committee on Theoretical and Applied Mechanics from its inception, and took part in the publication of the journals Prikladnaya Matematika i Mekhanika, Izvestiya RAN Mekharlika Tverdogo Tela, and Non-linear Mechanics, and he was also the chief organizer of All-Union conferences on the theory of plates and shells. He was a winner of the B. G. Galerkin Prize of the USSR Academy of Sciences (1953) and the State Prize of the Russian Federation in the field of science and technology (1998). He was elected an honorary foreign member of American Academy of Arts and Sciences (1970) received the title of Honoured Scientist of Russia (1970), and was awarded orders and medals. He published over 100 scientific papers, among

which his classical monograph on the theory of thin elastic shells (which has been printed in two editions and translated into English and Spanish), and his book on the vibrations of shells, which he wrote with coauthors V. B. Lidskii and P. Ye. Tovstik, are widely acclaimed. In his publications, the general linear theory of shells was developed and completed. He derived the equations of the discontinuity of strains, constructed stress functions, formulated the static-geometrical analogy, found the conditions of applicability of the variational principles of the three-dimensional theory of elasticity in the two-dimensional theory of shells, constructed the theory of temperature stresses in thin shells, demonstrated the possibility of transferring Kolosov-Muskhelishvili methods to the momentless calculation of shells traced by second-order surfaces of positive curvature, found an accurate closed analytical solution to the problem of the action of concentrated forces and moments on a complete spherical shell by moment theory, etc. On the basis of an asymptotic analysis of the two-dimensional linear equations of the theory of shells, he analysed existing approximate methods for the static calculation of the stress-strain state of a shell, investigated the dependence of the stress level and deformability of shells on the conditions under which its edges were clamped, and introduced the basic concept of the pseudo bending of a shell, generalizing the geometrical concept of the infinitesimal bending of surfaces. For a mathematical proof of the two-dimensional theory of shells, he developed a general scheme for the direct asymptotic integration of equations of the theory of elasticity, based on the smallness of the dimensionless thickness of the body, and on the basis of this he proposed a strict mathematical approach to formulating the boundary conditions for the equations of the theory of shells. For the steady-state vibrations of shells in a vacuum, and also in an acoustic medium, he carried out a qualitative analysis and formulated the classification of possible types of vibration. For a shell of general outline, he investigated the properties and formulated approximate methods of calculation. In the case of an acoustic medium, he found the regions of applicability of different approximate models describing the mechanism of the radiation of vibration energy. The above results are far from reflecting his multifaceted scientific activity. It is remarkable that he studied problems of the theory of shells from the moment he graduated from university until the end of his life. He always invested much mental effort in his teaching. Among his pupils are managers of academies of sciences of the Union republics (now independent states), directors of institutes and heads of departments, professors and lecturers, and doctors and masters of sciences. Many of them are now working in various countries worldwide. All those who knew him will remember an upright, sensitive, highly intelligent man with amazing presence of mind and composure, devoid of vanity and opportunism, always notable for his good sense of humour and never frittering away his energies. Translated by P.S.C.

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