Boris Grigorievich Galerkin | Encyclopedia.com

(*b*. Polotsk. Russia. 4 March 1871; *d*. Moscow, U.S.S.R., 12 June 1945),

mechanics, mathematics.

Galerkin was born into a poor family. He received his secondary education at Minsk, and in 1893 he entered the Petersburg Technological Institute. During his studies there Galerkin had to support himself first by giving private lessons and then, from the year 1896, by working as a designer.

In 1899, after graduating from the Technological Institute, Galerkin entered the Kharkov Locomotive Building Mechanical Plant. In 1903 he moved to St. Petersburg and started work in the Northern Mechanical and Boiler Plant as manager of the technical section. He quickly became known in engineering circles.

From 1909 to 1914 Galerkin studied Russian and foreign factories and engineering installations. He visited Germany, Sweden, Switzerland, Belgium, and Austria, becoming acquainted with the outstanding examples of foreign technology. In 1909 Galerkin was invited to teach at the Petersburg Polytechnical Institute. He was chosen head of the department of structural mechanics there in 1920. From 1923 to 1929 he was dean of the structural engineering department. During this period Galerkin was professor of the theory of elasticity at the Leningrad Institute of Communications Engineers and professor of structural mechanics at Leningrad University. From 1940 to 1945 he headed the Institute of Mechanics of the Soviet Academy of Sciences.

In 1928 Galerkin was elected a corresponding member of the Soviet Academy of Sciences, and in 1935 an active member. In 1934 he was awarded the title of honored scientist and technologist. In 1942 he received the title of state prize laureate.

Galerkin's scientific work was devoted to difficult problems in the theory of elasticity and structural mechanics. His first scientific work, *Teoria prodolnogo izgiba…* ("Theory of Longitudinal Curvature…"), appeared in 1909. Galerkin extended the theory of longitudinal curvature, created by Leonhard Euler, to multistage uprights formed by the joining of a series of vertical and horizontal rods.

In his second work, *Izgib i szhatie* ("Curvature and Compression," 1910), Galerkin investigated the curvature of a rod strengthened at one end by the action of force applied, parallel to the axis, to the free end with eccentricity (or force applied at any angle to the axis). Galerkin's early works in the area of longitudinal curvature opened broad possibilities for the application of the theory of longitudinal curvature to the calculation of the stability of bridges, the frames of buildings, and similar systems.

From 1915 to 1917, in connection with the beginning of the use of beamless floors in industrial and civil construction, Galerkin made his first profound research in the theory of the curvature of thin plates. He devoted many years of his life to its development. Galerkin's many works in this field were generalized in the monograph *Uprugie tonkie plity* ("Elastic Thin Plates"), published in 1933. In 1915 Galerkin proposed a method for the approximate integration of differential equations that was widely used for the solution of problems in mathematical physics and technology. It became known as Galerkin's method.

A series of works by Galerkin on the theory of torsion and the curve of prismatic rods, published in 1919-1927, developed an interesting problem in the theory of elasticity. In 1930-1931 his fundamental works on the theory of elasticity, which contain a general solution of three-dimensional problems, appeared.

Galerkin's scientific research in the theory of casing (1934- 1945) revealed its broad application in industrial construction. His works in the field constitute a new direction in this important area.

Galerkin was a consultant in the planning and building of many of the Soviet Union's largest hydrostations. In 1929, in connection with the building of the Dnepr dam and hydroelectric station, Galerkin investigated stress in dams and breast walls with trapezoidal profile. His results were used in planning the dam. For many years Galerkin was head of the Ail-Union Scientific Engineering-Technical Society of Builders.

The Soviet government established prizes in Galerkin's name for distinguished work in the theory of elasticity, structural mechanics, and the theory of plasticity, as well as stipends for graduate students.

BIBLIOGRAPHY

I.Originai Works Galerkin's writings were brought together in *Sobranie sochineny* ("Collected Works"). 2 vols.; I. *Issledovania po stroitelnoy mekhanike teorii uprugosti teorii obolochek* ("Research in Structural Mechanics, the Theory of Elasticity, and the Theory of Casing," Moscow, 1952); II, *Raboty po teorii uprugikh plit* ("Works in the Theory of Elastic Plates," Moscow, 1953).

II. Secondary Literature On Galerkin or his work see "Akademik Boris Grigorievich Galerkin. K 70-letiyu so dnya rozhdenia i 45-letiyu nauchnoy deya-telnosti" ("Academician Boris Grigorievich Galerkin. On the Seventieth Anniversary of His Birth and the Forty-Fifth Anniversary of the Beginning of His Scientific Career"), in *Izvestiya Akademii nauk SSSR, Otdelenie tekhnicheskikh nauk*, no. 4 (1941), pp. 115-120; *Boris Grigorievich* Galerkin. K 70-letiyu *so dnya rozhdenia i 45-leriyu inzhenernonauchnoy, pedagogicheskoy i obshchestvennoy deyatelnosti* ("Boris Grigorievich Galerkin. On the Seventieth Anniversary of His Birth and the Forty-Fifth Anniversary of the Beginning of His Engineering. Teaching and Public Career," Leningrad -Moscow. 1941); A. Joffe, A, Krylov, and P. Lazarew "Zapiska ob uchenykh trudakh professora B. G. Galerkina" ("A Note on the Scientific Works of Professor B. G. Galerkin"), *ibid. ,Otdelenie fiziko-matematicheskiklh nauk*, nos. 8- 10 (1928k pp. 616-618; A. N. Krylov *et al*., "Akademik B. G. Galerkin. (K 70-letiyu so dnya rozhdenia)" ("Academician B. G. Galerkin. [On the Seventieth Anniversary of His Birth]"), in *Vestrtik Akademii nauk SSSR*, no. 4 (1941), pp, 91-94; V. V. Soko-lovsky, "O zhizni i nauchnoy deyatelnosti akademika B. G. Galerkina" ("On the Life and Scientific Career of Academician B. G. Galerkin"), in *Izvestiya Akademii nauk SSSR, Otdelenie tekhnicheskikh nauk*, no. 8 (19511 pp. 1159-1164; and V. V. Sokolovsky and G. S. Shapiro. "Melody B. G. Galerkina v teorii uprugosti" ("B. G. (ialerkins Methods in the Theory of Elasticity"), in *Yubileyny sbonik, posvyashckenny tridtsutiletiyu velikoy oktyabrskoy sotsialisticheskoy revolyutsii* ("Jubilee Collection, Dedicated to the Thirtieth Anniversary of the Great October Socialist Revolution"), pt. 2 (Moscow-Leningrad, 1947); and "Boris Grigorievich Galerkin (1871 - 1945)." in *Materialy i konstruktsii v sovremennoy arkhitektare* ("Materials and Construction in Contemporary Architecture"), pt. 2 (Moscow, 1948).

A. T. Grigorian