



### **Professor Ilya Yakovich Shtaerman (1891-1962)**

I.Y. Shtaerman (1891-1962) - Ph.D., professor, an expert in the field of mechanics, corresponding member of the USSR Academy of Sciences (1939). The scientific activity of I.Y. Shtaerman was formed under the leadership of Professor of Mechanics University of Kiev: P.V. Voronets. Main areas of research I.Y. Shtaerman were devoted to the study of problems of the theory of elasticity, structural mechanics and mathematics. Ilya Shtaerman was born April 19, 1891 in the city of Mogilev-Podolsky; in 1910 - graduated from high school in Kamenetz-Podolsk and in 1915 - graduated from the Faculty of Physics and Mathematics of Kiev University. He published "Differential equations of the plate, rolling without slipping on a fixed surface," which has developed some of the provisions of the master's thesis of his teacher, P.V.Voronets. In 1918 he graduated from the Faculty of Engineering KPI; 1918 - 1941 he worked in the KPI and taught at the Kiev Institute of Public Education; 1920-1934 - member of Applied Mechanics committee, Academy of Sciences of the Ukrainian SSR; 1924-1941r. - Professor, Head of Department of Theoretical Mechanics KPI. In 1930 he defended his doctoral thesis "On the integration of the differential equations of equilibrium of elastic shells." 1934-1943 - Researcher, Institute of Mathematics, Ukrainian Academy of Sciences; 1943 - Professor of the Moscow Institute of Civil Engineering.

I.Y. Shtaerman developed a number of methods for solving the complex problems of the theory of elasticity. It was the first major study of this issue, as set out in Russian. As shown in this work, in the case of an infinite series in the largest simplify integration of the differential equations of equilibrium of elastic shells it can be achieved when the basic system of equations is possible to divide into separate mutually independent system of equations. I.Y. Shtaerman, ahead of well-known research I. Gekker, generalized the method of asymptotic integration in the case of the shell, the form of which is a body of revolution.

In "The transformation of the general solution of the elasticity problem for an arbitrary system of curvilinear coordinates" (1935) I.Y.Shtaerman summarized some research of Academician Boris Galerkin.

Much attention is deserved works of I.Y.Shtaerman dedicated to the contact problem of elasticity theory and related practically important question about the tension and the pressure at the pressure of elastic bodies on each other. I.Y. Shtaerman first showed the possibility of generalizing the Hertz problem by examining the case of compression of solids of revolution. In general, it is considered as a spatial contact problem when the interface is not small compared with the dimensions of the bodies that are in contact. This is a significant limitation in the Hertz problem. For each of the cases he brought formulas that determine the shape of the contact area between the two bodies, and received a law of distribution of normal pressures.

The results obtained I.Y.Shtaerman in contact problem of elasticity theory are reflected in his fundamental monograph "The contact problem of elasticity theory" (Gostekhizdat, 1949).

The works of I.Y.Shtaerman on issues of structural mechanics are very valuable. These include studies on the

theory of stability of elastic systems. I.Y. Shtaerman obtained new results on the stability of rods, arches and shells. Particularly important are the work of I.Y. Shtaerman on the stability of cylindrical, spherical and conical shells. His original research on modern methods of approximation of functions in structural mechanics and mathematical physics has made it possible to apply the theory of functions created by P.L. Chebyshev, for the calculation of structures, even in the presence of plastic deformations.

**Major works I.Y. Shtaerman:**

1930. Theory of oscillations State Publishing House of Ukraine, Kharkov, Kiev

1933 Hyperbolic functions Ukrainian Academy of Sciences, Kiev

1941 The law of universal gravitation. Lectures to help students of Marxism-Leninism Politizdat under the Central Committee of the Communist Party (Bolshevik), Kiev

1949 Contact problem in elasticity theory Gostekhizdat, M.-L.

1958. Collection of tasks on the basis of technical mechanics Trudrezervizdat, M.

This material was prepared by teachers of the department of theoretical mechanics, Kyiv Polytechnic Institute:  
Igor Sikorsky, S.G. Stepanenko, K.G. Levchuk