

PEOPLE OF SOVIET SCIENCE

ALEKSANDR YUL'EVICH ISHLINSKII ON HIS SIXTIETH BIRTHDAY



Aleksandr Yul'evich Ishlinskii, an outstanding example of Soviet science, a leading figure in general and applied mechanics, and an Academician of the Academy of Sciences of the USSR, celebrated his 60th birthday on August 6, 1973.

His vital and fruitful work stands as an example of selfless service to the Soviet State and to science. Having a great talent for mechanics, he not only obtained several fundamental results in various fields of mechanics but also made an important contribution to the development of special instruments in the Soviet Union, aiding in the establishment of a new, high-precision technology.

He was born in Moscow to the family of Yulii Éduardovich Ishlinskii, a naval mechanical engineer and a man of progressive persuasions, convicted by a Czarist court for his participation in the sailors' uprising at Kronshtadt in 1906. After grade school, Aleksandr Yul'evich Ishlinskii began the L.B. Krasin courses for electricians. Having independently studied the program of the first course in the mathematics department, he proceeded immediately to the second course at Moscow State University. After graduation, he remained there as a graduate student. Beginning in 1931, he worked at Moscow State University, where he brilliantly defended his master's thesis (Rocking Friction, 1938) and his doctoral dissertation (Mechanics of Incompletely Elastic and Viscoelastic Bodies, 1943). Here he polished and strengthened his pedagogical skills (becoming assistant professor of theoretical mechanics in 1938 and professor of the department of the theory of elasticity in 1945).

In 1947, on the invitation of the Academy of Sciences of the Ukrainian SSR, Ishlinskii moved to the Ukraine, and in 1948 he was selected an Academician of the Ukrainian Academy; simultaneously he became director of the Institute of Mathematics of the Ukrainian Academy of Sciences. He continued to teach, at Kiev University.

In 1955 he returned to Moscow to head the department of applied mechanics of Moscow State University, becoming the first director of the Institute of Mechanics of Moscow State University. At the same time he headed the mechanics division of the mechanics and mathematics department at Moscow State University.

Although devoting much effort to organization and administrative questions, Ishlinskii continues his creative work. His inquisitive mind continues to formulate and solve new problems. In recognition of his scientific work in the field of instrument construction, the Academy of Sciences of the USSR selected him as a member in 1960.

Translated from *Inzhenerno-Fizicheskii Zhurnal*, Vol. 25, No. 3, pp. 541-543, September, 1973.

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In 1965, Ishlinskii, an experienced and competent organizer, was appointed director of the new Institute of the Problems of Mechanics. Under his guidance the Institute has become a first-rank scientific-research facility.

A list of his scientific achievements runs so long that it is difficult to find a field of mechanics in which he has not contributed results of fundamental scientific and applied importance. Even a very incomplete list includes general mechanics, the mechanics of gyroscopic systems, automatic regulation and control, the theory of elasticity and plasticity, the dynamics of mechanical systems having friction, and soil dynamics. He is able to approach each new problem from the most general positions and to extract that which is most fundamental and most important. After obtaining important theoretical results through the solution of a problem he strives to point out the practical consequences.

He developed a variety of new problems in the theory of gyroscopes related to the development of systems for controlling moving objects. His work in this field covers an extremely large number of questions. He worked out theory for several gyroscopic instruments: an air-supported gyroscopic vertical, a multiple-rotor gyroscopic azimuth-horizon, a direction gyroscope, a gyroscopic bank equalizer, and a gyroscopic acceleration integrator. He refined the precise theory of gyroscopes, taking into account the forces associated with the interaction of the elements with their supports. In his very first papers on the theory of gyroscopes he developed an analytic method for obtaining an exhaustive solution of the basic kinematic problems of stabilizing systems. He proved a theorem on the buildup of solid angle. An original method which he worked out for studying the kinematics of Cardan joints allowed him to obtain several results regarding the errors in the determination and orientation of objects due to the geometry of finite rotations. In analyzing phenomena associated with the elasticity of structural elements of gyroscopic systems and vibrations of the bases of these systems, Ishlinskii showed why the standard equation for the nutation frequency of gyroscopic stabilizers gives results which are too high in practice. In a problem dealing with the motion of a gyroscopic horizon with contact correction, he used the methods of probability theory and studied the reasons for the deviation of the gyroscopic horizon and the effect of yaw of the craft on the gyroscopic horizon.

Ishlinskii was the first to solve a problem of importance in inertial navigation and autonomous control — that of determining the position of an object in accelerated motion along the earth's surface by means of gyroscopic instruments. Elegantly reformulating the Darboux equations of motion of gyroscopic instruments in a moving three-dimensional reference system, Ishlinskii analyzed the three-dimensional gyrocompass and the Schuler pendulum for arbitrary motion of its support point over the earth's surface. His monographs *Mechanics of Gyroscopic Systems* (1963) and *Inertial Control of Ballistic Rockets* (1968) were the results of his many years of research and are used daily by scientists, designers, and engineers.

The mechanics of deformable media occupies an important place in his scientific work.

He studied the behavior of rocking friction on a deformable base, worked out a general theory of plasticity with linear strengthening, solved the problem of the Brinell test, offered a new model for the deformation of soil during explosions, solved the problem of the stability of the viscoplastic flow of a cylinder and a circular plate, and formulated a generalized theory of an elastic-relaxing object and a new theory for the dynamic stability of solids subjected to shock loading (in collaboration with Academician M. A. Lavrent'ev).

The Soviet Union holds the scientific achievements of A. Yu. Ishlinskii in high regard: he has been designated a Hero of Socialist Labor and has been awarded the Order of Lenin, the Order of the Workers' Red Banner, the Medal of Honor, and the Lenin and State Prizes.

His work is well-known both in the Soviet Union and elsewhere; he is a foreign member of the American Geographical Society and the Polish Society of Mechanical Engineers. The People's Republic of Bulgaria has awarded him the Order of Cyril and Methodius of the First Rank.

Aleksandr Yul'evich Ishlinskii is an excellent teacher and scientific leader. The school he founded now includes hundreds of qualified specialists; dozens of doctoral dissertations and master's theses have been written under his guidance. He willingly shares his knowledge and experience with his students. He is also a talented scientific organizer. He is the chairman of the scientific councils of the Academy of Sciences of the USSR on general mechanics, friction, and lubricants; a member of the All-Union Central Council of Labor Unions; chairman of the All-Union Council of Scientific-Engineering Societies of the USSR; deputy chairman of the National Committee of the Soviet Union on Mechanics; chairman of the scientific-method council on theoretical mechanics of the Ministry of Higher and Secondary Special Education

of the USSR; a member of the Plenum on Higher Academic Courses; deputy director of the executive committee of the International Federation of Scientific Workers; and vice president of the World Federation of Engineering Organizations. He serves on the editorial board of the journal *Izvestiya Akademii Nauk SSSR, Seriya Mekhanika Tverdogo Tela*, and on that of the periodic collection of translations *Mekhanika*. In all his pursuits he is exceptionally demanding of himself and his colleagues, a principled and benevolent man.

We warmly and sincerely congratulate Aleksandr Yul'evich Ishlinskii on his 60th birthday, and we wish him good health and new fruitful work on behalf of the Soviet people.

The Editorial Board