# LEV ABRAMOVICH BULIS

## (ON THE OCCASION OF HIS SIXTIETH BIRTHDAY)



On August 7, 1972 the distinguished scientist of the KazSSR, Doctor of Technical Sciencies, Lev Abramovich Bulis became sixty years old.

In 1938, after completing his studies at the Physics Department of the Leningrad Polytechnic Institute, L. A. Bulis became a Candidate here and, at the same time, worked at the Central Boiler and Turbine Institute under the direction of Professor G. F. Knorre. Also his pedagogical career began then at the Leningrad Polytechnic Institute. During the years 1941-1944 while working at the "Teploenergoproekt," L. A. Bulis continued his scientific research and defended his candidatorial dissertation. In 1946 he completed his scientific and organizational assignment in the scientific-research institutes of the aviation industry. In 1946 L. A. Bulis defended his doctoral dissertation.

During those years he was Professor at the S. Ordzhonikidze Institute of Aviation in Moscow; he also taught at the Institute of Mechanics in Moscow and at the N. E. Zhukovskii All-Union Institute of Aerodynamics. In 1951 the USSR Ministerium of Higher Education assigned L. A. Bulis to the S. M. Kirov Kazakh State University, where he set up the Department of General and Molecular Physics and then the Thermophysical Problems Laboratory, both of which he directed for over ten years. At the same time, he also headed the Laboratory of Physical Fundamentals of Thermal Processes at the Power Institute, Academy of Sciences of the KazSSR, which he had organized. The creative collaboration between the two groups of thermophysicists from these scientific institutions has produced important theoretical and practical results. Since 1962 L. A. Bulis is active scientifically and pedagogically in Leningrad.

L. A. Bulis is a major expert in the field of thermophysics. The scope of his creative abilities are very diverse and broad: he has published over 200 articles (including several monographs) on gas dynamics, on the theory of viscous fluid jets, on the theory of combustion, and on magnetogashydrodynamics. His writings are widely recognized not only in the Soviet Union but also abroad. Characteristic of Lev Abramovich as a scientist is his continuing interest in most current scientific problems and his concern about the practical application of scientific achievements.

In the field of gas dynamics, a special mention deserves his theory of gas flow transition through a critical velocity. L. A. Bulis was the first to formulate the general conditions of transition through the acoustic velocity known in gas dynamics as the Law of Forces Reversal. A thorough exposition of this law and several of its applications to the flow of ideal and real gases (also two-phase flow) is found in the monograph "Thermodynamics of gas streams" (Gosenergoizdat, Moscow, 1950) along with the designs of new devices for attaining supersonic velocities.

The clarify of his thinking, generally characteristic of Lev Abramovich, is particularly well in evidence in his theory of the Rank effect — one of the many complex problems he has solved concerning the redistribution of energy in high-velocity gas streams.

In the field of hydrodynamics of viscous liquid and gas jets, a great deal of theoretical and experimental research must be credited to L. A. Bulis. For instance, he proposed and verified experimentally a method of calculating turbulent jets, where momentum transfer governs the mixing process. This method was used by L. A. Bulis for solving several important application problems, and it is used now in scientific-research and design-engineering enterprises. A thorough experimental study has been made of flow in a semibounded jet, of flow in the wake behind a solid body in a homogeneous stream, of flow in a turbulent jet, etc. A number of his latest studies deals with improving the heat transfer in turbulent jets or in a gas flame by means of mechanical stirring. These studies of jet flow are reported in the monograph "Theory of viscous fluid jets" (Nauka, Moscow, 1965).

In the field of combustion L. A. Bulis has contributed much to developments in the theory of the working process in fluid-reaction engines and in the theory of the thermal mode of combustion, he has also contributed much to research on the aerodynamics of turbulent diffusion flames and homogeneous flames, on the aerodynamics of furnaces and, specifically, of the cyclone chamber. The monographs on these subjects: "Some problems in the theory of the working process in fluid-reaction engines" (BNT, Moscow, 1947), "Thermal mode of combustion" (Gosenergoizdat, Moscow, 1954; McGraw-Hill, New York, 1961), and "Basic theory of the gas flame" (Energiya, Leningrad, 1968) are pervaded by the author's desire to apply the results of theoretical combustion analysis to the practical requirements of fuel combustion and to the solution of important engineering problems.

In the field of magnetogashydrodynamics L. A. Bulis has done fundamental research decisively influencing the further development of many new scientific disciplines. In 1960 he extended the Law of Forces Reversal to magnetogashydrodynamic flow. The equations of this law are universally accepted as the basis for a qualitative analysis of one-dimensional flow and for the design of MGD energy converters (generator or accelerator), electrogasdynamic generators, etc. L. A. Bulis has proposed and applied a method of physically simulating a magnetogasdynamic energy converter on the basis of the magnetic hydrogas analogy (MHGA). This method has yielded direct experimental evidence proving the Law of Forces Reversal in magnetogashydrodynamic flow, the basic features of the process in an MHD plasma generator could be duplicated and analyzed by this method. A very significant impact on magnetohydrodynamics had the phenomenological theory of two transition modes from laminar to turbulent flow, a theory developed by L. A. Bulis together with a method of calculating the flow relations with the aid of a universal interpolation formula based on a generalization of test data. An analogous calculation procedure had been proposed by L. A. Bulis earlier in conventional hydrodynamics. In addition, L. A. Bulis was also the author of an original graphicoanalytical method of calculating the characteristics of an MGD generator, he studied hysteresis and near-electrode effects in the MGD flow of low-temperature plasma, he studied jet flow of electrically conducting fuilds, etc. Part of the results is reported on his monograph "Theory of magnetogasdynamic flow in channels" (Atomizdat, Moscow, 1971).

Very interesting are the studies made by L. A. Bulis in simulating various physical processes (radiative heat transfer, propagation of neutrons in nuclear reactors, thermal mode of combustion, thermal state of concrete embankments, heat transfer during phase transformations, etc.) with the aid of new types of electrical and optical integrators as well as hydrointegrators. L. A. Bulis supervised the measurement of thermophysical constants, he proposed and applied a new method of calorimetric measurements on the basis of thermal flux values.

L. A. Bulis is creatively very active in educating new generations of scientists and teachers. Over forty candidatorial dissertations were defended under his guidance and several of his students became Doctors of Science. An important role in educating science students played the Science Seminar under L. A. Bulis. It is still a year-round institution which is widely known and enjoys great prestige not only among Lev Abramovich's students and associates but also in scientific circles all over the country.

L. A. Bulis is constantly engaged in important work with scientific societies: he is a member of two Science Councils at the Academy of Sciences of the USSR, namely on complex problems in "High-temperature thermophysics" and in "Methods of direct conversion of thermal energy into electric energy," he is also on the editorial board of the journal Magnitnaya Gidrodinamika. In recent years he always appears on the organizing committees for All-Union conferences (symposia) on combustion and explosion, on magnetohydrodynamics, etc.

By a decree by the Presidium of the Supreme Council of the Kazakh SSR, since June 24, 1961, L. A. Bulis bears the honorific title of Distinguished Scientist of the Kazakh SSR, in recognition of his contributions to the development of science.

L. A. Bulis' contributions as an outstanding scientist and brilliant pedagog, as well as his moral qualities, scrupulous adherence to principles, fairness, and impartiality, have earned him a high esteem among scientists in many different fields.

We wish Lev Abramovich good health and further creative accomplishments.