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ON THE SEVENTIETH BIRTHDAY OF IL'YA IZRAILEVICH BLEKHMAN†

The seventieth birthday of Il'ya Izrailevich Blekhman, a leading expert in the theory of non-linear oscillations, the dynamics of machines and vibration technology was on 29 November 1998 . Blekhman was born in Kharkov and completed five years of middle school in Leningrad before World War II. During the blockade of the city in 1942 he was evacuated to the Urals, and after passing two intermediate examinations as an external candidate, left school with the award of a gold medal. Between 1945 and 1947 he studied at the Mechanics Department of the Urals Polytechnic Institute and, at the same time, at the Mechanics and Mathematics Faculty of the Urals State University as an external student. In 1947 he entered the Physics and Mathematics Faculty of Leningrad Polytechnic Institute, graduating with distinction as a research engineer in technical mechanics in 1951. The famous physicists, mathematicians and mechanics theorists whose lectures he attended during his student years included Dzhanelidze, Ioffe, Lur'ye, Malkin, Numerov, Smirnov and Fikhtengol'ts.

Blekhman began his research and engineering career in 1949 (while still a student) at the All-Union Scientific Research and Design Institute for the Mechanical Processing of Mineral Resources, where he subsequently set up and currently directs a theoretical department in the area of mechanics and applied mathematics. Since December 1986 he has been Director of the laboratory of vibration mechanics run jointly by that institute and the Institute of Problems of Mechanical Engineering of the Russian Academy of Sciences. He defended his candidate dissertation in 1955 and his doctoral thesis in 1962. He was made a professor in 1969.

Blekhman has promoted and developed several new areas in the theory of non-linear oscillations, in applied mechanics, and in the theory of vibration processes and mechanical engineering. Among his most important achievements are: the development (together with G. Yu. Dzhanelidze) of the theory of vibrational motion—the process of "directed" slow changes, which occur under the effect of rapid

"undirected actions"; the discovery of the self-synchronization of rotating bodies (rotors) and the construction of a theory to explain this phenomenon; the determination of an extremum condition for stability, which applies the classical theory of Lagrange and Dirichlet on the stability of equilibrium positions to synchronized rotations of weakly interacting bodies; the discovery and investigation of a class of non-linear mechanical systems which, during vibration, acquire the "average potential" property: slower motions in those systems correspond to the motions of a certain average potential system, although the original system is highly non-potential; the application of the classical Laval self-balancing principle to multirotor and non-linear systems; the discovery (jointly with colleagues) and theoretical justification of the development of gravitational gas lift flows, which has facilitated plans for the efficient exploitation gas lift flows, which has facilitated plans for the efficient exploitation of the energy and raw materials of the Pacific Ocean and the prevention of some ecological disasters; and the development and validation of a general mechanical-mathematical approach to the study of the effect of vibration on non-linear mechanical systems (vibration mechanics and vibrorheology).

Many of these results have already been reported in reference and teaching publications.

The discovery, theoretical justification and description of the synchronization of rotating bodies and the development of gravitational gas lift flows have been registered as scientific discoveries.

Blekhman has done some important work in engineering designs, notably, the construction of new vibration machines for enriching mineral resources—crushers, mills, sifters, flotation units, concentrators and so on. He and his successors have taken out more than 300 patents for inventions, and have sold licences to leading firms in the USA, England and Germany. He is a co-author, with A. D. Myshkis and Ya. G. Panovko, of *Applied Mathematics: Subject, Logic and Special Methods* (1976). This book describes the methodological features of applied mathematics as a science and has received wide recognition.

Blekhman established a research school in the area of the theory of vibration processes and machines: seven doctorates have been awarded and about 40 candidates have been taught; he is a member of panels which judge doctoral dissertations at the Institute for the Mechanical Processing of Mineral Resources and the St. Petersburg Maritime Technical University, as well as a number of research councils of the Russian Academy of Sciences. He has given several courses of lectures for post-graduates and students of higher courses in various higher technical teaching institutes in St. Petersburg and has lectured at the MIT in the USA, at polytechnic universities in Great Britain, Germany, Holland, Denmark and Poland and at a number of other teaching establishments abroad. Blekhman has been a member of the Russian National Committees on theoretical and applied mechanics and (since 1965) on the theory of machines and mechanisms; in 1990 he was made a full member of the Russian Engineering Academy, followed by the International and St Petersburg Engineering Academies.

Blekhman has taken an active part in the publication of *Applied Mathematics and Mechanics* and *The Mechanics of Solids* over more than 45 years.

The editorial staff of this journal wish him a happy birthday, good health and further career success.

Translated by R.L.