Robert V. Goldstein, Eulogy

Our colleague and remarkable person Robert Goldstein passed away. He was one of the leading specialists in mechanics of solids and its applications; he obtained fundamental results in mathematical and dynamical theory of elasticity, fracture mechanics, mechanics of materials, mechanics of ice and ice cover, micro- and nanomechanics, and mechanics of contact interaction of solids. He was elected a corresponding member of the Russian Academy of Sciences in 2008. The Griffith Medal was awarded to Robert Goldstein at the 21st European Conference on Fracture, 2016, Catania.

Robert Goldstein was born on May 7, 1940 in Moscow. In 1962, R. V. Goldstein graduated with honors from the Faculty of Mechanics and Mathematics of Lomonosov Moscow State University in the speciality mechanics. He received a scholarship named after N.Ye. Zhukovsky, when he was a student. In 1965, Robert V. Goldstein received his Ph.D. ("Surface waves and resonant phenomena in elastic bodies") and started to work at the Institute for Problems in Mechanics of the Academy of Sciences of the USSR (now - Ishlinsky Institute for Problems in Mechanics RAS), where, since 1988, he was Head of Laboratory on Mechanics of Strength and Fracture of Materials and Structures organized by him. In 1983, he defended his D.Sc. thesis "Studies in Fracture Mechanics of Large-Size Structures".

R.V. Goldstein developed several models of material and structure of fracture. He proposed a semi-empirical method for describing fracture of elastoplastic materials with cracks and formulated similarity criteria that permit estimating the fracture conditions for large-size structural components with cracks by the test results of their scaled-down models. He developed a new approach for fracture modelling and safety assessment of hierarchical systems. Brittle and quasi-brittle fracture structure formation of materials (media) taking into account their structure under complex loading (in particular, under multi-axial compression), was modeled in the cycle of papers written in collaboration with his colleagues. Fracture models under compression conditions for thin bodies, systems with coating, and natural objects such as ice cover were developed.

In the last 20 years. R.V. Goldstein paid much attention to research of nano- and micromechanics of materials. These investigations primarily were stimulated by the need to

provide the strength and durability of micro- and submicro-electronic products. The models were developed and degradation processes arising in multilevel interconnection wiring (conductor lines) in micro- and submicro-electronic products due to the action of mechanical loads and electromigration were modeled. The discrete-continuous models of the mechanical behavior of nanotubes and their systems, graphene plates and their sets, were developed. A generalized model of an atomistic crack was proposed and conditions for the continuum approach of fracture theory to be applicable for describing nanoscale crack growth conditions were obtained. The results of R.V. Goldstein's fundamental studies are successfully used to solve applied problems. Since the 1960s, R.V. Goldstein actively participated in complex projects performed in collaboration with leading specialized organizations in the field of special technology and equipment for transportation, preparation, and processing of hydrocarbon raw materials.

R.V. Goldstein paid great attention to young scientists. He created one of the leading schools in Russia on strength and fracture mechanics, and 18 Ph.D. and 5 D.Sc. were received under his supervision. R.V. Goldstein was awarded grants of the President of the Russian Federation to support the leading scientific schools in 1996, 2000, 2003, 2006 and 2008.

R.V. Goldstein's scientific and educational achievements were marked by governmental awards. In 2008, he was awarded the title of "Honored Scientist of the Russian Federation." In 2000, in collaboration with other authors, R.V. Goldstein was awarded the State Prize of the Russian Federation in science and technology.

Robert Goldstein was the scientific editor of many books published by leading publishers of the USSR and Russia in mechanics and applied mathematics. He was a member of Editorial Board of several journals:

- Mechanics of Solids;
- Advances in Mechanics;
- Physical Mesomechanics;
- International Journal of Fracture;
- Fatigue and Fracture of Engineering Materials and Structures.

He has received many awards including:

- Scientific Secretary of the Joint Scientific Council of the Russian Academy of Sciences on the Complex Problem of "Mechanics"
- Deputy Chairman of the Scientific Council of the RAS on Mechanics of Solids;
- Member of the Scientific Council for Tribology;
- Member of the Scientific Council of the RAS for the Study of the Arctic and Antarctic;
- Member of the Scientific and Technical Council of OJS “GAZPROM”;
- Vice President of the International Congress on Fracture (ICF) (since 2005);
- Member of the Executive Committee of the ICF (since 2001);

- Member of the Executive Committee of the European Structural Integrity Society (since 1997);
- Member of the National Committee for Theoretical and Applied Mechanics (since 1991);
- Honorary Fellow of the ICF (since 1993);
- Member of the German Society for Applied Mathematics and Mechanics (GAMM) (since 1991);
- Member of the International Society for Mechanics and Mathematics Interaction;
- Honorary Fellow of the International Congress on Fracture (1983);
- Honorary Vice-President of the International Congress on Fracture (2010);
- Honorary Fellow of the European Structural Integrity Society (2010);
- Full member of the Russian Engineering Academy (2009);
- Full member of the European Academy of Sciences "For outstanding contribution to science and technology" (2009);
- Chairman of the Organizing Committee of 19th European Conference on Fracture (ECF19) (Kazan. Russia, 2012);
- Griffith Medal, European Structural Integrity Society, ECF 21 (Catania, Italy) (2016).

Robert Goldstein passed away on September 24, 2017 in Moscow, Russia.

Valery Shlyannikov