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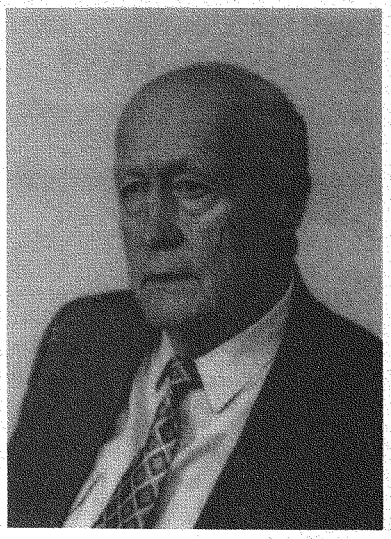
DYUIS DANILOVICH IVLEV
(on the occasion of his 70th birthday)†



The honoured Russian scientist Professor Dyuis Danilovich Ivlev, Dr Phys.-Math. Sci., celebrated his 70th birthday on 6 September 2000.

Professor Ivlev graduated from the Mechanics and Mathematics Faculty of Moscow State University (MSU) in 1953, where he also defended his Master's thesis (1956) and his Doctor's thesis (1959).

His research has been devoted to solid mechanics, focusing mainly on the mathematical theory of plasticity, and he developed ideas associated with the construction of classical models of the theory of elasticity and hydrodynamics.

More than a century ago, Saint-Venant formulated relations for the two-dimensional problem of ideal plasticity theory. The Saint-Venant relations led to a statically determinate system of equations of the hyperbolic type, and the body of mathematics proved to be quite adequate to describe the effects accompanying the developed flow of plastic material.

The extension of the mathematical theory describing the two-dimensional flow of an ideal rigid plastic material to the general case has been the subject of a number of investigations. The conditions of proportionality of the stress and strain rate deviator components (Levi and von Mises) generally lead to a statically determinate system of equations of the elliptic type. Relations for the three-dimensional problem of the theory of ideal plasticity, given a state of full plasticity, were proposed by Ishlinskii (1944), who used an isotropy condition that did not assume, in the general case, the proportionality of the stress and strain rate deviator components.

In 1959, Ivlev showed that, given a state of full plasticity, the equations of the three-dimensional problem of ideal plasticity theory form a statically determinate system and are of the hyperbolic type. It was shown that it is the state of full plasticity, and only this state, that makes it possible to formulate the general theory of ideal plasticity with a body of mathematics corresponding to the shear nature of ideally plastic deformation. These results were extended to the case of an anisotropic and compressible ideally plastic material.

Ivlev studied discontinuous solutions for the three-dimensional state of ideally plastic solids and gave solutions of the general equations of the theory of ideal plasticity that determine the limiting state of material compressed by rough plates.

He paid considerable attention to problems of duality: to the equivalent construction of the theory of plasticity by determining the loading function and the associated law of plastic flow, or determining

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the dissipative function and the associated loading law. He analysed the different assumptions upon which the construction of plasticity theory is based, and drew up a balanced summary of the integral inequalities leading to the associated law of plastic flow and the associated loading law. A number of investigations were carried out on the relations between the flow and loading laws in generalized variables. In the relations of the associated laws, terms defining the influence of anisotropies on the behaviour of the deformed material were determined and distinguished.

The steady and unsteady two-dimensional flows of ideally plastic media were investigated further by him. The relations defining the general two-dimensional state of ideally plastic bodies were examined.

In the theory of strain-hardening plastic media, he developed ideas based on the translational mechanism of strain hardening, as incorporated in investigations by Ishlinskii and Prager. An algorithm was proposed for constructing models of complex media possessing internal mechanisms of plasticity, viscosity and elasticity. The influence of internal mechanisms of viscosity on the plastic behaviour of bodies (the apparent corner point effect, etc.) was investigated.

He developed the small-parameter method for problems of the rigid plastic and elastoplastic state of solids. A number of problems concerning the determination of the boundary dividing zones of elasticity and plasticity for two-dimensional, axisymmetrical and three-dimensional bodies were solved.

Besides those mentioned above, Professor Ivlev has carried out research on the limit states of structures, the statics and dynamics of free-flowing materials, the stability and behaviour of elastoplastic bodies, hydrodynamics, fracture mechanics, etc.

His work has made a fundamental contribution to solid mechanics. He has around 200 publications, including four monographs. He is a member of the National Committee for Theoretical and Applied Mechanics of Russia, a member of the Editorial Board of the journal *Mechanics of Solids*, a member of the Expert Council of the Higher Certifying Commission of the Russian Federation, Chairman of the Dr Phys.-Math. Sci Dissertation Committee and an active member of the Chuvash Academy of Sciences and Arts. His disciples include doctors and masters of science.

His colleagues, friends and students, the Editorial Board and the editorial staff of *Applied Mathematics and Mechanics* send their best wishes to Professor Ivlev on his 70th birthday and wish him good health and much future success.

Translated by P.S.C.