



ES Seminar Series No.58

IRREVERSIBLE DEFORMATION AND FRACTURE IN SOLIDS: STATICS VS DYNAMICS

The traditional quasi-static approach to analyzing physical phenomena often creates the illusion of paradoxes where none exist. The features of deformation and fracture of continuous media in dynamics, which are radically different from the usual quasi-static concepts, are discussed. It is demonstrated why classical "equilibrium" models are powerless in explaining many contradictory dynamic effects, and why direct extrapolation of the usual static principles and criteria of fracture to the non-stationary case, even with dynamic coefficients and corrections, often leads to erroneous conclusions. The main provisions of the structural-temporal approach to dynamic problems of irreversible deformation and fracture are presented, and the possibilities of its application for predicting and explaining effects arising in various transient processes of mechanics and physics are demonstrated. It is demonstrated that the integration of physical analysis with classical models of non-stationary dynamics provides a powerful toolkit for understanding and predicting effects that appear contradictory and even paradoxical. This makes it possible to explain complex dynamic phenomena without resorting to the artificial introduction of new entities, and opens up promising directions for further research in the field of solid mechanics.



29 October, 2025 (Wednesday)

14:00-15:30 Beijing Time



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Prof. Yuri Petrov

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Professor Yuri V. Petrov (born Jan 27, 1958) graduated from Leningrad (St. Petersburg) State University year 1980. He got his Ph.D. degree from Leningrad (St.-Petersburg) State University year 1985 and Dr. Sci. degree from the Russian Academy of Sciences year 1995. In 2006 prof. Petrov was elected to serve as a Corresponding Member of the Russian Academy of Sciences (RAS) and in 2025 he was elected as a Full Member of the RAS. Currently he holds the positions of department head (department of "Extreme States of Materials and Structures", Institute for Problems in Mechanical Engineering of the Russian Academy of Sciences), Director of the Research Centre of Dynamics (<http://www.rcdlabs.com>) and a Professor of Mechanics at the Elasticity department of the faculty of Mathematics and Mechanics of St. Petersburg State University.

