

*Keynote presentation of Anatolii Kretov*

**On Structural Optimization and Its Features  
for the Structures with High Temperature**

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**Abstract.** A brief historical overview of the problem on structural design is presented. Some features of the structural optimization for heated structures are discussed. An optimization algorithm for structures with heating performed from the elements with dissimilar mechanical characteristics is suggested. The solution of the problem is based on the use of optimality criterion method. The minimum pliability of the construction is used as an optimization criterion under the condition of ensuring static equilibrium in the finite element formulation. The Lagrange multiplier method is used to obtain a recurrent formula for finding the optimal values of the design parameters. Topological optimization is performed by excluding passive elements from the initial most General structure by minimizing their rigidity. The contradiction in the work of the optimization algorithm from mechanical and thermal loads, built on the minimization of the potential deformation energy, is shown. Numerical analysis of typical examples is presented. A numerical analysis of typical examples is presented and an assessment of the level of temperatures at which traditional design algorithms have an unstable solution and cannot be used to solve such problems is made. A criterion for evaluating the possibility of using the optimization algorithm on the temperature level is proposed.



**Anatolii Kretov** Doctor Eng.Sc. (1999), professor (2002). He graduated from the Kazan Aviation Institute (Kazan national research technical University named after A. N. Tupolev-KAI). A. Kretov has research experience with the Central Aerohydrodynamic Institute (TSAGI) and with the Public Joint Stock company "Tupolev". Since 2015, A. Kretov has been a Professor at the Nanjing University of Aeronautics and Astronautics. His area of expertise is the design of high-speed aircraft and structures, as well as weight designing. He is the author of 80 articles and co-author of two books.