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Issues in Optimization

This 90 minutes lecture to be delivered via telelink addresses a class of MIT undergraduates unrolled in Engineering Design and Rapid Prototyping Course. The students have been introduced to the basic optimization concepts of design variables, design space, objective function, constraints and numerical search methods. Building on this elementary basis, the purpose of the lecture is to make the students aware of a broad range of theoretical and practical issues that arise when optimization is applied in real-life engineering. To that end a gamut of topics is presented with emphasis on the qualitative exposition rather than in-depth mathematics. The topics include:

- How to tell whether optimization is needed
- Optima: Sharp & Shallow; Local & Global
- Multiobjective optimization
- Optimization across the walls of conventional practice
- Systems optimization: couplings, sensitivities, what to optimize for
- Approximations
- Invention by optimization? The role of human mind.
- Multiprocessor computing – a new world for optimization.

Time will be allowed after each section of the presentation for Q & A from both the MIT and local audiences..

Dr. Jaroslaw Sobieski

Degrees through doctorate in technical sciences from the Technical University of Warsaw (TUW), Poland. Concurrently with industry design and consulting, faculty positions at TUW 1955-66, St. Louis University 1966-71; George Washington University 1972-91; University of Virginia 1991- present; and post-doctoral research at the Technical University of Norway, Trondheim, 1964-65 and summer 1966. On the staff of NASA Langley since 1971, several research and supervisory position in structural and in multidisciplinary analysis & design optimization, and design studies of aerospace systems. Manager of the Langley's portion of the Computational Aerospace Sciences Project under the High Performance Computing and Communication Program HPCCP, 1996-2000. Currently Sr. Res. Scientist in Analytical and Computational Methods. AIAA Fellow and the Founding Chairman of the AIAA Technical Committee for Multidisciplinary Design Optimization. Recipient of: the NASA Medal for Exceptional Engineering Achievement, and the AIAA National Award for Multidisciplinary Analysis and Optimization in 1996. Co-Recipient of the SAE Wright Brothers Medal 1999. Several technical publications in professional journals and books. Co-Editor of international journal Structural and Multidisciplinary Optimization. Listed in the Marquis' Who is Who in America and Who is Who in the World.