

THE NATIONAL UNIVERSITY of SINGAPORE
Department of Industrial & Systems Engineering
AND
Operational Research Society of Singapore

JOINT SEMINAR
On

Optimal survivability enhancement in complex vulnerable systems

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Abstract: Complex vulnerable systems can have different states corresponding to different combinations of available elements composing the system. Each state is characterized by a system performance rate, which is the quantitative measure of a system's ability to perform its task. Both the impact of external factors (attack) and internal causes (failures) affect system survivability, which is determined as probability of meeting a given demand.

One of the ways to enhance the system survivability is to separate elements with the same functionality (parallel elements). Since system elements can have different performance rates and different availability, the way in which they are separated strongly affects system survivability. We formulate the problem of how to separate the elements of series-parallel system in order to achieve a maximal possible level of system survivability by the limited cost. Another way to increase the system survivability is to protect its elements or groups of them. We present the algorithms for evaluating survivability of protected systems (including systems with multilevel protection in which protected subsystems are destroyed by external impacts only if all of the levels of their protection are destroyed), introduce the protection survivability importance index and formulate the optimal protection problem. Finally we consider the case when the system with multilevel protection is exposed to multiple factor impacts.

About the Speaker: Dr. Gregory Levitin received the B.S. and M.S. degrees in Electrical Engineering from Kharkov Politechnical Institute (Ukraine) in 1982, the B.S. degree in Mathematics from Kharkov State University in 1986 and Ph.D. degree in Industrial Automation from Moscow Research Institute of Metalworking Machines in 1989. From 1982 to 1990 he worked as software engineer and research associate in the field of industrial automation. From 1991 to 1993 he worked at the Technion (Israel Institute of Technology) as a postdoctoral fellow at the faculty of Industrial Engineering and Management. Dr. Levitin is presently an engineer-expert in the Reliability Department of the Israel Electric Corporation and adjunct senior lecturer at the Technion. His current interests are in operations research and artificial intelligence applications in reliability and power engineering. In this field Dr. Levitin has authored more than 80 papers and two books. He holds 7 patents and serves on the editorial board of *Reliability Engineering and System Safety*.