

Optical System Engineering - designing to operate at the shot-noise limit

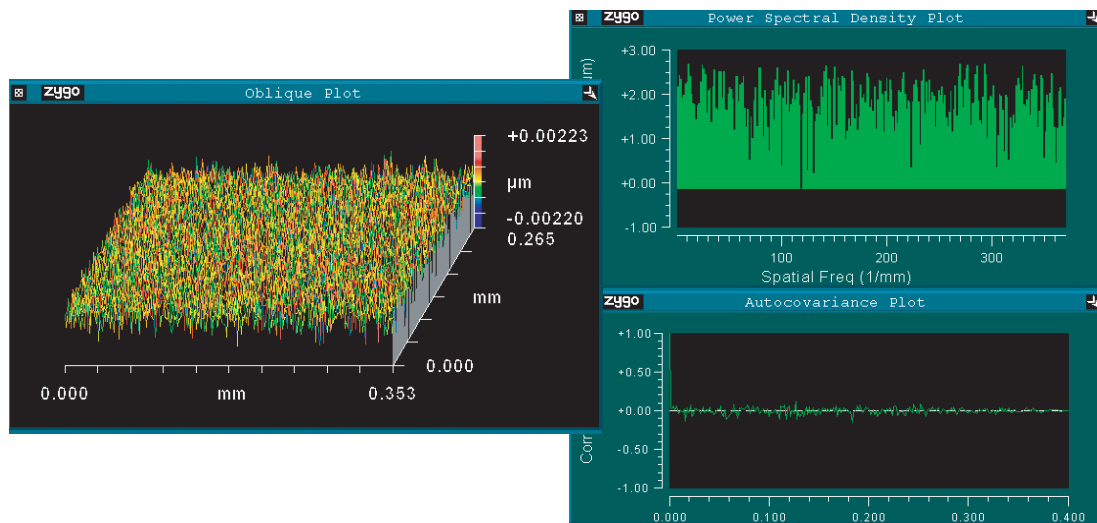


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A tutorial introduction to systems engineering
applied to the design of a commercial opto-mechanical
system operating at the shot-noise limit.

Co-Sponsored by Department of Mechanical Engineering



3:00 pm, Monday, Feb 15, 2010
Sloan Auditorium, Goergen 101
Refreshments provided.

HAJIM
SCHOOL OF ENGINEERING
& APPLIED SCIENCES

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Abstract: Whether or not companies and managers understand the title of system engineer they understand the need. Systems engineers and technical program managers are needed to guide the activities of development teams chartered with executing a company's most important programs. Historically, system engineering was recognized as necessary only for managing large programs in large organizations where the professionals were organically trained within the organization. More recently, this perception has changed and the universal need for this discipline is reflected in programs and degrees being offered at various universities.

System engineering (SE) is one part skepticism and one part mathematics. It is a struggle that starts with a marketing requirement and culminates in manufacturing. The principles and methods of SE can be applied to the design of a scientific experiment, a one-of-a-kind system for space flight, or a commercial product such as an interferometer. In each case, time and budget can be minimized using the scientific method and the SE approach.

Starting from some classical training I have developed simple customized methodologies for SE and program management and have optimized them for easy application and use in the commercial world. I will present SE methods applied to the design and optimization of MOEMS based optically transparent switches for telecommunication industry. We will also consider how SE design optimization has produced a commercially available interferometer that operates at the shot-noise limit. Introduction to the concepts of measurement uncertainty and absolute calibration of interferometers will also be presented.

Biography: Steve Chakmakjian Obtained his B.S. in Physics (1983) from University of Bridgeport, Bridgeport, Ct. with a minor in mechanical engineering. He obtained his Ph.D. in Optics (1990) from the Institute of Optics, University of Rochester, Rochester, N.Y. He went to General Electric Astro-Space Division in Valley Forge, Pa. working in the Electro-optics department on the Phased Integrated Laser Optic Technology program (PILOT) employing external cavity diode laser array coupling with phase sensing and control. In 1991 he joined the USAF at Kirtland AFB, Albuquerque, NM. There he worked as a system engineer on the ABL-ACE atmospheric characterization experiment to support the airborne laser program office. He successfully flew a >100km path differential interferometer that operated between aircrafts for the purpose of characterizing upper atmospheric turbulence. In 1996 Steve joined Zygo Corporation, Middlefield, Ct. as a Senior Member of Technical Staff responsible for the development of the scanning white light microscope profilers. He developed the NewView 5000 product. In 2000 Steve joined Rochester Photonics a division of Corning Inc., Rochester, N.Y. as a system engineer and program manager in the Optical Networking Devices Division. There he managed optical switch program developments including a transparent optical switch as well as a multi-wavelength selectable switch product. In 2003 Steve was part of the Corning spinoff of RPC Photonics serving the role of Chief Technology Officer, and in 2005 President and COO. There he developed a one-of-a-kind drum laser writing system for mastering of structured surface optical films for illumination and display industries. In 2007 Steve rejoined Zygo Corporation where he is presently in the role of Director of Engineering in the Instruments Business Unit. Steve manages a group of engineers responsible for the development interferometric metrology products for research and manufacturing across various industries.