Smart Optics Systems: A Multidisciplinary Research Program on AO in the Netherlands

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Purpose

This presentation gives a brief overview on the research program Smart Optics Systems that was funded in 2008 by the Dutch National Science Foundation. The listed authors act as the committee directing this program. They have defined the research framework in which 6 innovative research projects were defined. Within these projects about 15 phd and/or postdocs are active.

Program Details.

The research framework of the SOS program aims at making the use of optical components, such as deformable mirrors, wavefront sensors, etc. acceptable on a wide industrial scale. The program aims at achieving this goal in two ways. First, it aims at developing technology for a dramatic improvement in the quality of optical instruments. Second, it will result in a new and optimized integrated design that will allow for true integration of smart optics into the next generation of imaging equipment.

Such integrated design approach, that takes the capabilities of for instance feedback control into consideration, directly from the onset of the design of the imaging equipment, has the potential of achieving the optimal overall design. Such integrated approach may lead to similar breakthroughs as was manifested in the last century by the development of operational amplifier. Here feedback control enabled the production of high performance components from low quality and low cost physical open-loop components.

In addition to the methodological improvement anticipated by the program, the goal is pursued in two organization manners. First in the definition of six multi-disciplinary research projects, where in each project researchers with a different technological expertise work intensively together on a common imaging demonstrator. A second way to disseminate the knowledge and the experience between the researchers actively involved in the program on one hand and between these researchers and external experts on the other hand is enabled by the organization of program meetings on an annual basis.

Within the program the following six projects have been defined:

1. Integrated High-resolution Observing through Turbulence
2. Smart Microscopy of Biological Tissues
3. Integrated Smart Microscopy
4. Waveguide-based External Cavity Semiconductor Laser Arrays
5. Smart Multilayer Interactive Optics for Lithography at Extreme UV wavelengths
6. Image Manipulation for Wafer Plane Conformity in Optical Lithography Systems

The presentation will give a brief overview of each of these projects, then zooming in on some recent contributions.