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Introduction

This year, the conference *Modelling Aspects in Optical Metrology* is organised for the third time as part of the SPIE Optical Metrology Symposium: co-located with *LASER World of Photonics* 2011 in Munich, Germany. This conference is dedicated to establish a forum to present and discuss in particular basic methods, techniques, and algorithms which are necessary for a proper modelling and simulation of applied optical metrology techniques. Special emphasis is placed on the description and modelling of new methods, algorithms, components or complete measurement systems.

Optical metrology methods are in general fast, non-destructive, reliable, flexible, and can nevertheless reach a high level of sensitivity. Therefore, their use in industrial applications like e. g. process development or production control is continuously increasing. Concurrently, the metrological requirements are soaring rapidly, leading to a strong demand both on methodical extensions and improved metrology methods.

To exploit the full potential of optical metrology it is of utmost importance to be able to fully understand the optical measurement process, which requires the ability to quantitatively predict the dependence of the output of an optical sensor or measurement system on certain variations of the measurement object, the sensor itself, or the measurement environment. Only if these influences on the measurement result are well understood and appropriately taken into account in a suitable model of the measurement process, will the measurement result and its associated measurement uncertainty can be used for example for reliable control of production processes. This in-depth understanding usually requires -or is at least strongly supported by- a reliable modelling or simulation of the optical measurement process. In this sense modelling is a prerequisite for traceable and comparable measurements.

Important topics are for example the development and verification of methods to describe the interaction of light with matter for quantitative characterization of micro- and nanostructures or the high accuracy description of light propagation in optical systems. Relevant applications range i. a. from optical metrology and inspection of nanostructures on masks and wafers in semiconductor industry, display production, the investigation of grating structures and grating-based devices, the metrology of surfaces and layers to characterisation of complex optical systems. In many applications nanometer or sub-nanometer measurement uncertainties are required. This year for the first time the new and fascinating field of new and effective optical materials like photonic crystals or metamaterials are one focal point of this conference. These new materials are not only interesting and challenging regarding their metrological characterisation

and theoretical description, but will in future also enable a variety of novel optical components, systems and metrology systems.

I would like to thank all contributors, participants, the SPIE staff, the members of the program committee as well as the Co-Chairs for their support and for turning this conference into a success.

Bernd Bodermann