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Modeling Aspects in Optical Metrology VI

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Editors

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Introduction

The conference *Modeling Aspects in Optical Metrology VI* is organised as part of *SPIE Optical Metrology Symposium*, which is co-located with *World of Photonics* Congress 2017 in Munich, Germany. This conference is dedicated to establishling a forum to present and discuss the basic methods, techniques, and algorithms that 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 such as process development or production control is continuously increasing. Concurrently, the metrological requirements are soaring rapidly, leading to a strong demand for both methodical extensions and improved metrology methods.

It is of utmost importance to fully understand the optical measurement process in order to exploit the full potential of optical metrology. This requires the ability of quantitatively predicting 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 considered in a suitable model of the measurement process, 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. This is particularly essential for recent and novel approaches in optical nanoscopy to bridge the gap between super-resolution imaging and real metrological applications.

Important topics are 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 from optical metrology and inspection of nanostructures on masks and wafers in the semiconductor industry, display production, advanced photovoltaics, 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. New and very interesting fields of application will arise in the physical and dimensional characterisation and the theoretical description of new and effective optical materials like photonic crystals or metamaterials. In combination with a better understanding and exploitation of novel nano-photonics and plasmonics, these developments will in the future

enable a variety of novel optical components, systems and metrology systems with enhanced performance.

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

Bernd Bodermann
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Richard M. Silver