Fringe 2013
Wolfgang Osten
Editor

Fringe 2013

7th International Workshop on Advanced Optical Imaging and Metrology
25 years ago it was a joint idea with Hans Rottenkolber to organize a workshop dedicated to the discussion of the latest results in the automatic processing of fringe patterns. This idea was promoted by the insight that automatic and high precision phase measurement techniques will play a key role in all future industrial and scientific applications of optical metrology. A couple of months later more than 50 specialists from East and West met in East Berlin, the capital of the former GDR, to spend 3 days with the discussion of new principles of fringe processing. In the stimulating atmosphere the idea was born to repeat the workshop and to organize the meeting in an Olympic schedule. And thus meanwhile 24 years have passed and we have now already the 7th Fringe workshop.

However, such a workshop is always embedded in a dynamic environment. Therefore the main topics of the previous events were always adapted to the most interesting subjects of the new period. In 1993 the workshop took place in Bremen and was dedicated to new principles of optical shape measurement, setup calibration, phase unwrapping and nondestructive testing, while in 1997 new approaches in multi-sensor metrology, active measurement strategies and hybrid processing technologies played a key role. 2001, the first meeting in the 21st century, was focused to optical methods for micro-measurements, hybrid measurement technologies and new sensor solutions for industrial inspection. In 2005 the fifth workshop was organized for the first time in Stuttgart, the capital of the state of Baden-Württemberg and the center of a region with a long and remarkable tradition in machine construction, vehicle manufacturing and optics. The topics in 2005 were extended to include resolution enhanced technologies and principles of wide-scale 4D optical metrology. For the Fringe 2009 we decided to stay in this region but to make a slight shift of the conference place from Stuttgart to Nürtingen. Nürtingen - a lovely medieval village – offers everything needed for a good conference: a nice conference hotel, attractive surroundings and a stimulating atmosphere. The topics have undergone a refreshment again: digital wavefront engineering and sensor fusion.

For the FRINGE 2013 we meet again in Nürtingen. This brings back a moment of stability for the workshop. However, we extended the scope markedly by accentuating the bridge between optical imaging and metrology. While the previous workshops were dedicated to optical metrology, the scope of the Fringe 2013 was extended to include advanced technologies in both disciplines, optical imaging and
optical metrology. On the one hand, optical imaging and optical metrology are self-standing topics with a long tradition. On the other hand, the current trends in both disciplines show increasing dynamics stimulated by many fascinating innovations such as high resolution microscopy, 3D imaging and nano-metrology. Consequently, both are getting even younger every day and are stimulating each other more and more. Thus, the main objective of the workshop was to bring experts from both fields together and to bridge between these strongly related and emerging fields. New topics are computational imaging, model-based reconstruction, compressed sensing, solutions to inverse problems, multimodality, in-line performance and remote technologies. This extended scope was honored again by a great response to our call for papers. Leading scientists from all around the world submitted more than 200 papers. This enormous response demanded a strong revision of the papers to select the best out of the overwhelming number of excellent papers. This hard job had to be done by the program committee since there is a strong limitation of the number of papers which can be presented and discussed during our workshop without having to deal with parallel sessions – a lasting feature of the Fringe workshops.

The papers presented in this workshop are summarized under 5 topics:

1. New methods and tools for the generation, acquisition, processing, and evaluation of data in optical imaging and metrology,
2. Application-driven technologies in optical imaging and metrology,
3. High dynamic range solutions in optical imaging and metrology,
4. Hybrid technologies in optical imaging and metrology, and
5. New optical sensors, imaging and measurement systems.

As in the former workshops, each topic is introduced by an acknowledged expert who gives an extensive overview of the topic and a report of the state of the art. The classification of all submitted papers into these topics was again a difficult job which often required compromises. We hope that our decisions will be accepted by the audience. On this occasion we would like to express our deep thanks to the international program committee for helping us to find a good solution in every situation.

The editor would like to express his thanks to all the authors who spent a lot of time and effort in the preparation of the papers. My appreciation also goes to Dr. Eva Hestermann-Beyerle and Birgit Kollmar from Springer Heidelberg for providing again excellent conditions for the publication of these proceedings. My deep thanks is directed to the members of the ITO staff. The continuous help given especially by Valeriano Ferreras Paz, Katharina Bosse-Mettler, Katja Costantino, Christina Hüb, Heiko Bieger, Erich Steinbeißer and Tobias Böttcher was the basis for making a successful FRINGE 2013. Finally, our special thanks and appreciation goes to all friends and colleagues for sharing with us again the spirit of the Fringe workshop.

Looking forward to FRINGE 2017.
Stuttgart, September 2013
Wolfgang Osten
Conference Committee

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