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Special Section Guest Editorial: Spatial Light Modulators: Devices and Applications

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Spatial light modulators (SLMs) are optoelectronic devices that modulate amplitude, phase, and polarization of light waves in space and in time/frequency. Well-established technologies such as liquid-crystal devices (LCDs) and digital micromirror devices (DMDs) are currently used in a myriad of applications requiring these capabilities, and as a result have become ubiquitous in the optics and photonics community, driving progress in many disciplines. Newer devices with higher resolution, higher speed, or wider operational spectral ranges are extending their use in different applications. This special section of *Optical Engineering* devoted to Spatial Light Modulators: Devices and Applications includes contributed and review articles covering a diverse set of topics.

Good operation of SLMs relies on the precise characterization of their diffractive properties. This topic is tackled in the paper by Márquez et al., where analytical expressions for the diffracted field generated by parallel-aligned liquid-crystal on silicon (LCOS) devices is derived and compared to experimental implementations. The paper by Carbonell-Leal and Mendoza-Yero deals with the effects of pixel cross-talk and its mitigation when applying a double-phase technique to produce complex fields with phase-only SLMs. Finally, the paper by Scholes et al. presents a theoretical characterization and best practice recommendations for DMD operation that ensure their correct use for the generation of structured light with high fidelity and improved efficiency.

A modern application of SLM includes the creation and manipulation of vector states of light. The paper by Pachaba et al., is a review article covering the generation and analysis of scalar and vector modes carrying orbital angular momentum (OAM), including methods based on active devices, such as LCOS and DMD devices. This topic is also treated in the article by Peng et al., where the properties of vector vortex beams passing through a paraxial optical system are analyzed.

The creation and detection of structured light is crucial for many applications, including metrology, imaging, micro-manipulation, and communications. The paper of Balasubramani et al. introduces a chiral binary square axicon, a novel phase-only diffractive optical element that is applied in an optical trapping experiment. Finally, the article by Arines-Piferrer and García introduces a wavefront-sensing technique that is useful for the precise alignment of SLMs in adaptive optics systems.

This special section presents a small sample of the many different issues related to SLM technology and numerous applications. We hope that these manuscripts will constitute a useful collection and guideline for OE readers interested in SLMs.