

# AOIM2013

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## **All-digital holographic tool for real-time mode excitation and analysis in optical waveguides**

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### **Abstract content :**

A real-time procedure for multiplexing and demultiplexing of transversal modes in optical waveguides is presented, based on dynamic and static digital holograms. By using a spatial light modulator (SLM) to encode a digital hologram, the desired complex field is shaped and injected into the waveguide. The SLM's ability to rapidly refresh the encoded transmission function enables one to excite pure single modes, as well as arbitrary coherent mode superpositions, in real-time. The modes leaving the output of the waveguide are subsequently demultiplexed by applying a holographic correlation filter for modal decomposition, thus allowing for an all-digital-hologram approach to modal analysis of wave guiding structures. The working principle is tested using conventional step-index large mode area (LMA) fibers being excited with higher-order single modes as well as superpositions thereof. Extending this approach to a closed-loop-system, enables one to control amplitude- and phase distribution of the emerging optical field.

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