

# Measurement of Orbital Angular Momentum (OAM) with Freeform Optical Elements

#### Abstract



Optical beams carrying orbital angular momentum (OAM) have been shown useful in telecommunication, because of their capacity to encode many (theoretically unbounded) information states. Despite of this advantage, decoding information – measuring the OAM – is often challenging. Following the work of M. P. J. Lavery et al., we build up an optical setup, with two freeform optical elements that transform the OAM into linear phases, in VirtualLab Fusion. With this setup, we demonstrate the efficient OAM measurement.

## **Modeling Task**



concept and freeform lens parameters follow from M. P. J. Lavery, et al., Opt. Express 20, 2110-2115 (2012)

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## Simulation Result with Input L=-1



## Simulation Result with Input L=0



## Simulation Result with Input L=+1



## Simulation Result with Input L=+2



## Simulation Result with Input L=+3



#### **Peek into VirtualLab Fusion**

#### flexible definition of microsctructure surfaces

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#### visualization of field quantities (e.g., the phase)



#### **Workflow in VirtualLab Fusion**

- Customize microstructure surfaces
  - How to Work with the Programmable Interface & Example (Spherical Surface) [Use Case]
- Set the Fourier transforms properly
  - Fourier Transform Settings Discussion at Examples
     [Use Case]

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#### **VirtualLab Fusion Technologies**





#### **Document Information**

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further reading	<ul> <li><u>Generation of Optical Beams Carrying Orbital Angular Momentum</u> (OAM)</li> <li><u>How to Work with the Programmable Interface &amp; Example (Spherical Surface)</u></li> </ul>