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Setup of a 300-meter Optical Link through Atmospheric Turbulence

One of the largest problems faced in free space optical communication is the influence of atmospheric turbulence on a beam's structure. Thus, investigating the effects of turbulence on beams has become a major research area in recent years. Experiments within this research area have mainly been performed by generating turbulence within a laboratory setting using, for example, phase screens on a spatial light modulator. Few experiments have made use of real atmospheric turbulence generated naturally outdoors. Therefore, in this work, a setup which has been used to investigate the effects of outdoor turbulence on a beam is described. This setup includes three main stages. The first stage is the beam generation stage which is used to produce modes within the Laguerre-Gaussian and Hermite-Gaussian mode sets. The second stage involves a 300-meter optical link through the atmosphere as well as the parts of the setup required to process the beam before and after sending it through the link. The third and final stage is the modal decomposition stage. This work describes the experimental setup and use of each of these stages as well as the challenges that arose during each stage due to the use of real atmospheric turbulence. Additionally, measurements taken using the setup are presented.

Apply to be considered for a student ; award (Yes / No)?

Yes

Level for award;(Hons, MSc, PhD, N/A)?

MSc

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