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Threading a laser through the eye of a needle: Multimode Fibre Coupling in Turbulence

The unequal access to reliable internet connectivity between urban and peri-urban areas remains an issue of concern in many developing countries, including South Africa. A major reason for this so-called 'digital divide' is the unequal distribution of fibre infrastructure, which is usually due to economic or geographic reasons. This could be mitigated through the deployment of Free Space Optical (FSO) communication, which would extend the optical network to marginalized areas, without the need for more fibre infrastructure. FSO systems would provide access to a wider and unlicensed spectrum, allowing for faster and cheaper internet connectivity. Despite its many benefits, modern FSO technology remains too expensive and inaccessible to low-income residents of peri-urban areas. The cost of such technology could be significantly improved by hacking off-the-shelf fibre hardware, such as small form-factor pluggable (SFP) transceiver modules. However, unlike in fiber optical networks, a light beam propagating in free space is faced with a number of attenuation factors such as divergence, atmospheric turbulence and beam wander. These factors increase the complexity of coupling light into hardware kilometers away. As such, the optimization of light coupling is a crucial step to be taken if off-the-shelf fibre hardware is to be used in FSO applications. This poster will present the optimization of light coupling from free space into an SFP module, by analyzing different coupling mechanisms to determine the optimum method.

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Yes

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

MSc

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