qbeam

OPTICAL RANGE SIMULATOR

Range simulator consists of two identical benches (single bench shown above) coupled together with Single-mode or Multi-mode fiber. FSO transceivers are not installed.

The Range Simulator is a multipurpose optical test-bed designed to allow simultaneous operation of both sides of a Free-Space Optical Link (FSO) in the lab for testing and characterization. It consists of a pair of light-weight test platforms each configured with a large parabolic mirror and Single-mode or Multi-mode fiber precisely located at the mirror's focus. The transmitter under test, aligned to the range simulator, outputs its beam toward the mirror. The focused beam undergoes a fourier transform placing the far-field intensity profile at the fiber tip. The light coupled into the fiber exits the other end of the fiber, diverging toward the second parabolic mirror, which produces a collimated beam that illuminates the FSO receiver. The power in the fiber can be modulated to simulate real world conditions.
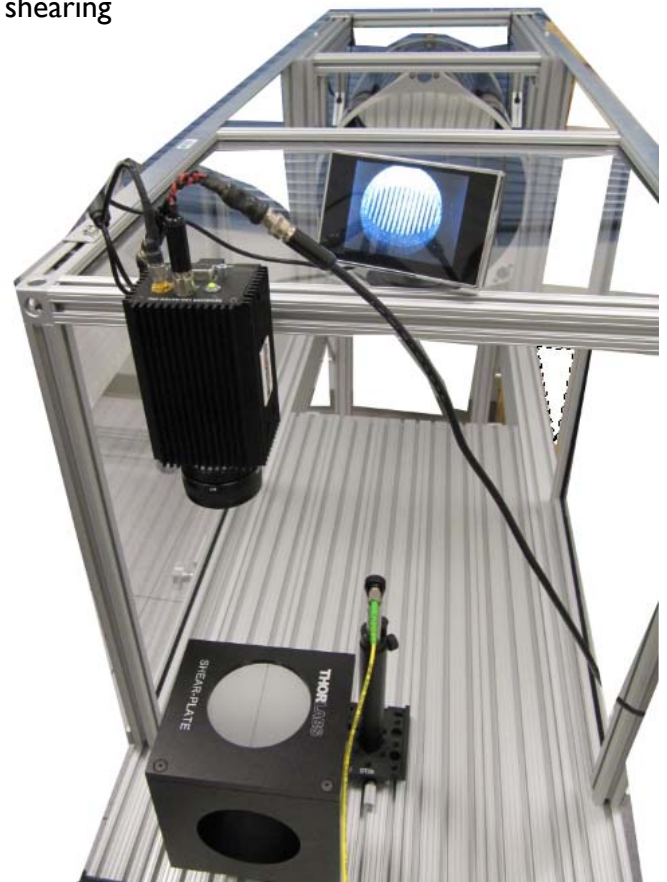
FSO links often require a minimum separation (sometimes greater than one Kilometer) between transmit and receive heads due to multiple transmit or receive apertures or due to telescopes with obscurations. The range simulator solves this minimum range limitation.

BENEFITS

- Optical equipment verification after receipt and prior to shipment

- Optical System training without having to be in the field

- Debug/repair

- Link characterization (transmit beam divergence measurement, tracking performance, characterization in simulated turbulence)

- Demonstrations

FEATURES

- Produces a highly collimated wide beam that can also be used for interferometric applications

- Utilizes low cost yet high performing parabolic mirrors

- Works with telescopes with central obscurations, multiple transmit apertures, multiple receive apertures

- Single-mode or Multi-mode fiber is used to generate either a Gaussian beam or a beam with spatial intensity fluctuations (simulating optical turbulence)

- Intensity fluctuations can be induced using Single-mode or Multi-mode amplitude modulators

- Beam tracking performance can be simulated and analyzed using an integrated fast steering mirror in the range simulator to reproduce receive-side or transmit-side terminal vibrations (Az/El motion) or beam angle of arrival perturbations

- Boresight alignment of multiple transmitters or receivers can be accurately and easily performed using one half of the Range Simulator setup

- Easy self-alignment of the instrument utilizes an included shearing nterferometer for precise beam collimation

- Mirrors are solidly attached and held in a sling to ensure stress-free mounting

- Height adjustable fiber adapter used to launch/collect light (connector type selectable)

SPECIFICATIONS (Model ERS-14-1650)

- 14" F/4.5 parabolic mirror (customizable)

- Wavefront better than lambda/4 peak-valley at 633nm

- Wavelength band 1000 – 2000 nm (Transmission > 90%)

- Protected Aluminum coating (customizable)

- Optical bench can be operated horizontally or vertically (to reduce the footprint in the lab)

- Solid three-point tip/tilt mirror adjustment

- Single-mode, Multi-mode (50 or 62.5 um) fiber connects between the two benches. A short fiber length of only several meters is needed. This fiber length does not simulate the effective range of the link. The range simulator models far-field operation and range losses.

Range Simulator setup and calibration procedure is straight forward and can be performed by a lab technician.