Florida Institute of Technology

AVAILABLE TECHNOLOGY

ORBITAL ANGULAR MOMENTUM IN SPATIALLY MULTIPLEXED OPTICAL FIBER COMMUNICATIONS

Summary

Multiple light beams are launched into a single optical fiber, each respective light beam with a corresponding signal. Each of the respective multi-beams are separated by launching each of the light at a different incidence angle and/or input position, into the optical fiber. In this way, each light beam is able to propagate independently according to its own trajectory inside the fiber. The resultant multi light beams propagate with respective counter cyclical orbital angular momentum with respective helical paths.

Applications

- This is a novel new technique that adds a new dimension to optical communications and systems. Multiple channels of exactly the same or differing wavelengths occupying exactly the same or different locations inside an optical channel can be transmitted and detected using the angular momentum of photons.

Advantages

- In a preferred embodiment, the ability to transmit two optical vortices in two (2) channels with the same orbital angular momentum but with opposite topological charge and with counter cyclical rotational directions, inside a single fiber simultaneously while preserving each light beam's orbital angular momentum and countercyclical rotational direction, permits simultaneous transmission of two optical channels at the same spatial location by using separate respective orbital angular momentum, in conjunction with intensity of light to detect signals instead of the conventional methods of employing intensity alone to detect the presence or absence of a signal.

The Technology

The subject invention pertains to a method and apparatus for multiplexing in optical fiber communications. Method And Apparatus For Spatial Domain Multiplexing In Optical Fiber Communications. Multiple light beams, are launched into a single optical fiber, each respective light beam with a corresponding signal. The respective multi-beam excitation and separation in a single optical fiber, as disclosed, is accomplished by launching one or more light beams, each at a different incidence angle and/or input position, into the optical fiber. In this way, each light beam is able to propagate independently according to its own trajectory inside the fiber. As shown and described in U.S. Pat. No. 7,639,909, the projection of the light beam is in an annular ring with a respective radius dependent on the launch angle or skew angle of the light beam into the optical fiber.

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