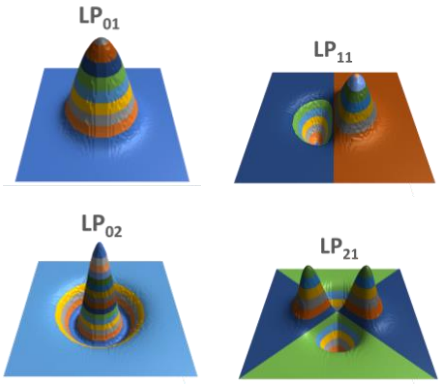
Centre of Applied Photonics

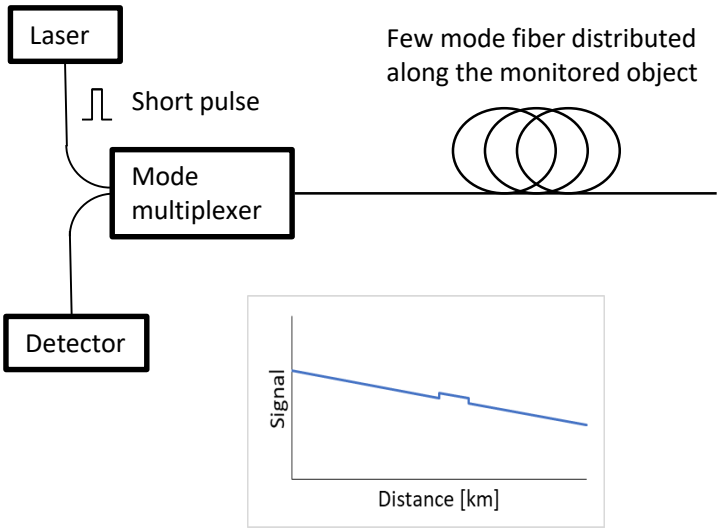
Optical Fiber Distributed Sensing

- Using next generation few mode fiber technology



Spatial optical mode distributions of an optical fiber

Examples include the fundamental mode (LP_{01}) and a few higher order modes



Basic distributed sensing system

Value Proposition/USP

Today distributed sensing is used for example for intrusion monitoring e.g. around airports, for temperature monitoring of e.g. pipelines and high voltage cables, and for fatigue monitoring of large structures such as bridges. We want to further improve the performance of distributed sensing systems by use of a novel type of optical fibers, more specifically, few mode fibers (FMFs) as opposed to using conventional fibers, which only support a single mode.

Business Opportunity/Objective/Commercial Perspectives

Compared to state-of-the-art systems, by using specialty fibers, the aim is to obtain improved performance such as better sensitivity and spatial resolution, as well as the ability to simultaneously discriminate between strain and temperature variations.

Technology Description/Technology Summary

FMFs are a new class of optical fibers, which have been developed over the last few years. FMFs support only a "few" (typical in the order of 3 to 10) modes. Single mode fibers and multimode fibers, which have been in use for more than 40 years, support only one mode or more than fifty modes, respectively. The aim is to demonstrate and quantify the benefits of using FMFs for distributed sensing. For example, for few mode Brillouin scattering based sensors, it is the aim to use FMFs for unambiguous detection of temperature and strain, which is not possible today.

Development Phase/Current State

DTU Fotonik and Danish Optical Fiber Innovation is currently working on development of technologies for conversion and multiplexing between optical fiber modes for applications within telecommunication in the project INCOM, funded by Innovation Fund Denmark. Use of few mode fibers for distributed sensing has been demonstrated by other groups. The TRL level is 1-2. We are seeking partners for research collaborations for further exploring use of few mode fibers for distributed sensing.

The inventors

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Seeking

- Research Collaboration