SHAPE SENSING WITH A MULTICORE OPTICAL FIBER

In this specific medial application, a multicore fiber is used as a shape sensor in a catheter. A multicore has the advantage of being small and the fiber itself is the complete shape sensor. The outer diameter of a multicore fiber is identical to that of a single fiber, which is only 125µm.

A standard optical fiber has one core and since this core is located in the center it will not measure strain when a fiber is bend. In a multicore fiber typically 4 or 7 cores are present in a symmetric pattern around the center. Because of the different distances to the center, each core will experience a different strain when the fiber is bend. FBG sensor can be written in each of the cores.

With the use of a ***MultiGator*** system with synchronized read-out, all FBG sensors in the multicore fiber are measured simultaneously. With the measured strain values and the use of the Frenet-Serret formulas, the 3D shape of the fiber can be reconstructed. New developments are ongoing in this field with twisted multicores, this opens new possibilities to include torsion measurements with the same fiber.

SwitchedGator

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