

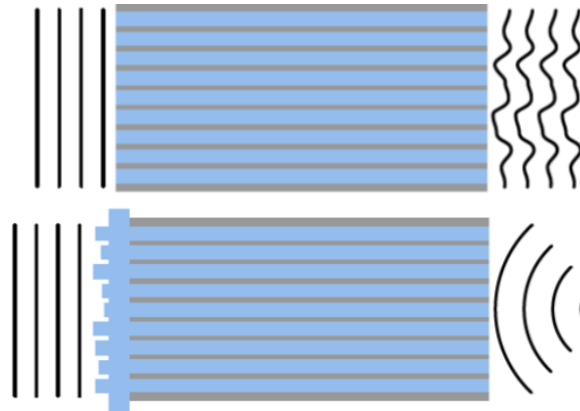
Compensation of the optical transfer function of a CFB with a subtractive phase mask

Motivation

Endoscopes based on coherent fiber bundles (CFBs) allow the investigation of samples that are difficult to access. Therefore, imaging through CFBs is a recent topic in computational optics and allows diagnostics with a footprint below 500 μm , for instance for 3D imaging inside of the brain.

Due to imperfections from the manufacturing process of the CFBs, there are phase errors disturbing the transfer of information through the fiber. However, the optical transfer function (OTF) of the CFB can be compensated with additive or subtractive phase masks.

Here, the subtractive approach should be investigated. Through the use of laser ablation with femtosecond lasers, the exact and residue-free removal of smallest amounts of material without significant heat transfer is possible. Thereby, a correcting phase mask can be created directly on the CFB.



Tasks

- Characterization of the optical transfer function (OTF) of a CFB
- Control of a femtosecond (fs) Laser
- Compensation of phase errors by subtractive manufacturing of phase masks on the CFB with laser ablation using a fs Laser

Key words

Endoscopy, Phase mask, Laser ablation, Material processing, Control technology, Holography

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