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optical communication and processing.



- Complex 3D structures are created.



University.

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Using the inverse radon transform, we can get the index of refraction profile for a commercial fiber and waveguide: a) Single Mode Optical Fiber b) Laser-manufactured



Index change in (a) was around 0.006. This is in good agreement with the given index change by the manufacturer, which was also 0.006. The index change in (b) is around 0.0054.

Using the machine learning-based limited-angle tomography, we can reconstruct the 3D refractive index profile of a waveguide:



Using machine learning tomography, we get an index change for (c) of 0.0047. The disparity between the measured index changes for the inverse radon transform and the limited angle method can be explained by the data that was taken. In the case of the waveguide, full rotation of the material is not possible or capturing images from every angle can potentially lead to disrupting the structure. This could lead to inaccurate analyses for IRT. When used along with machine learning, this can compensate for unknown data, and still produce accurate results.



Results

Conclusion

Fabricated optical waveguides in Corning Eagle Glass. Performed tomographic interferometry to find the 3-D index profiles of both a commercial fiber and a laser-manufactured waveguide. Performed machine learning-based limited-angle tomography to reconstruct the 3-D index profile of a manufactured waveguide.