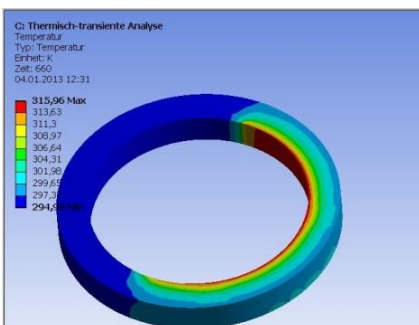




Space grade fiber optic gyroscope based on standard components



Thermal transient analysis of optical fiber coils with specific winding geometry, e.g. cylindrical, differential, quadrupole

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## Research and Development of Fiber Optic Gyroscopes

Gyroscopes are used to measure the rotation rate of manned/unmanned vehicles. They are part of inertial measuring units (IMU) and find applications in mobile devices, cars, planes, satellites and much more.

At the Fraunhofer Institute for Reliability and Microintegration we are developing different fiber optic gyroscopes for our customers and partners.

We are working on the system development of Interferometric Fiber Optic Gyroscopes (IFOG) and Resonant Fiber Optic Gyroscope (RFOG). That includes the preparation and selection of optical components, algorithms for control of active components, signal analysis, integration of optical and electrical parts, functional and reliability testing of components and systems.

A special research topic is the thermal mechanical modeling of optical fiber coils with different winding geometries, e.g. cylindrical, differential and quadrupole winding. That gives us the opportunity to recommend an appropriate coil winding and a simple regression model to compensate the rotation rate error with temperature measurement at the outside of the fiber coil.

R&D topics at Fraunhofer IZM:

- System development
- Integration of optic gyroscopes
- Integration of electrical and optical components
- Control algorithms and signal analysis

Our Technologies for optic Gyroscopes:

- Integrated optic waveguides in thin glass substrates
- Silicon and Glass interposer for electronic packaging
- Glass fiber processing, e.g. fiber splicing, single mode coupler, coil winding
- Active optical alignment machine with placing accuracies  $< 0.1 \mu\text{m}$  and  $< 2 \text{ arcsec}$

How to work with Fraunhofer IZM:

- Industrial Contract Research
- Service for Industry
- Strategic Alliances
- Cooperative Projects
- Technology Transfer
- Common Basic Research



Experimental fiber optic gyroscope setup for testing issues of components, e.g. fiber depolarizer, air fiber coil, integrated beam splitter