

RSoft Application: Interferometric Fiber-Optic Gyroscope (I-FOG) Sensor

Single-Mode Fiber (SMF) for Civilian and Military Applications

Overview

A major US-based defense company needed to model and develop I-FOG systems for classified military applications.

The Challenge

- ▶ Ring interferometers based on the Sagnac effect pose modeling challenges for system simulators
- ▶ I-FOG systems require advanced models such as broadband sources and comprehensive fiber model, as well as Monte Carlo ray tracing capabilities to study phase and polarization reciprocity effects.

The Solution

RSoft™ OptSim™ and OptSim Circuit provide capabilities to study bidirectional interferometric effects. OptSim provides models for broadband sources and fibers that take into account linear, nonlinear and polarization-related transmission impairments. OptSim also provides a Sagnac effect model to capture differential phase-shift originating from the rotation of the fiber loop.

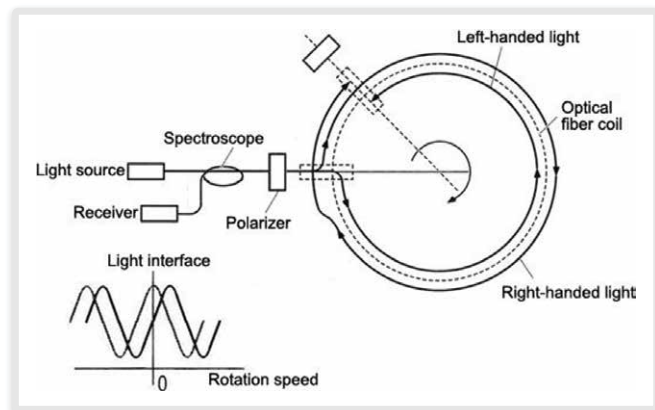


Figure 1. Principle of operation: Sagnac effect in an I-FOG

The Result

An OptSim plot of the output power versus rotation rate at different phase bias points is shown in Figure 2. The output shape in absence of phase bias has a sine shape with maximum sensitivity (and slope) around a zero rotation rate. The sensor can be used for civilian and military applications of positioning, orientation and absolute direction measurements.

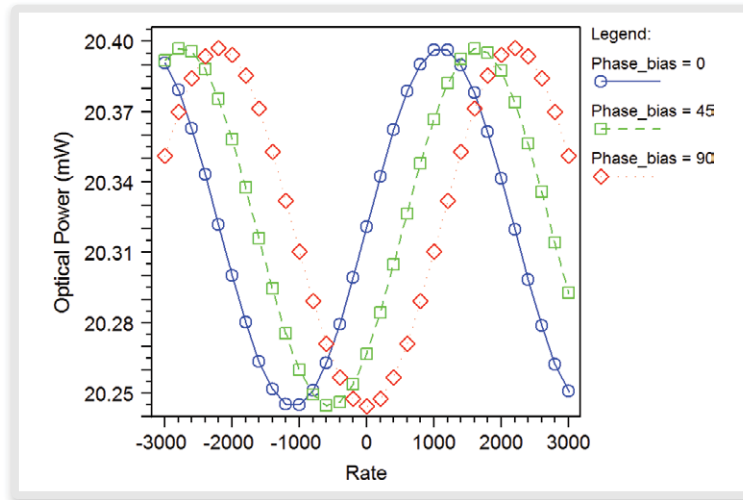


Figure 2. I-FOG intensity vs. rotation rate at different phase bias points

For more information, please contact Synopsys' Optical Solutions Group at (626) 795-9101, visit <http://optics.synopsys.com/rsoft/>, or send an e-mail to rsoft_sales@synopsys.com.