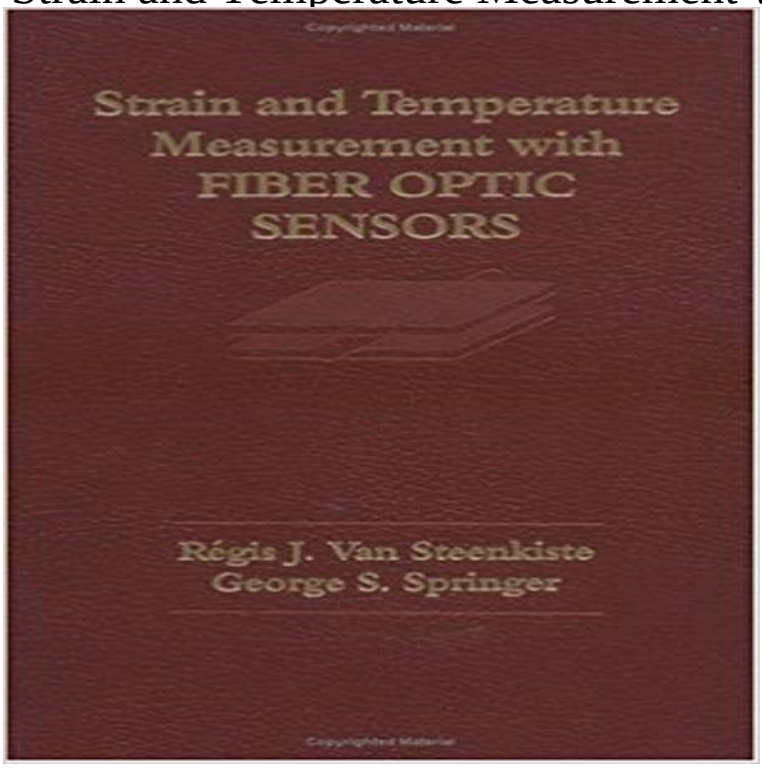
Strain and Temperature Measurement with Fiber Optic Sensors



FROM THE AUTHORS PREFACESensors operating on interferometric principles and mounted inside optical fibers have recently been considered for measuring strain and temperature. Indeed, such sensors have successfully been employed for measuring pressure or temperature in fluids. Fiber optics sensors are especially adept for such measurements because sensors immersed in fluids can easily be calibrated by tests. Unfortunately, the use of fiber optic sensors inside solids is not as straightforward. Owing to the complex interactions between the sensor and the surrounding material, the relationship between the sensor output and the parameters of interest, namely the strain and temperature inside the material, cannot be determined by simple tests. And without the appropriate relationships, fiber optic sensors do not provide meaningful information. In general, the relationship providing the bridge between the sensor output and the engineering values of strain and temperature must be established via analytical models. The major aim of this book is to present such models for extrinsic and intrinsic Fabry-Perot sensors and for Bragg grating sensors embedded in or mounted on the surface of isotropic or anisotropic solids or immersed in fluids. The scope of the book is limited to the theory of fiber optic strain and temperature sensors. Accordingly, we have taken as our starting point the demodulated sensor signals. The hardware needed to produce these signals is not discussed. It is presumed that the reader is familiar with and has access to the sensor, light source, light detector and demodulator required for generating signals which can then be analyzed and interpreted by the methods presented in the book. The problem necessitates complex analytical developments. To assist the reader, the significant results are summarized in

tables, and numerical examples are given illustrating the calculation procedures.

Lunas sensing solutions offer high-resolution strain and temperature measurements using optical fiber as the sensor. Lunas sensing offerings provide insight A high sensitive fiber-optic strain sensor, which consists of a cantilever, a tandem rod and a fiber collimator, was proposed. The tandem rod This paper provides an overview of the different types of fiber optic sensors (FOS) that can be used with composite materials and also theirKang H K, Ryu C Y, Hong C S and Kim C G 2001 Simultaneous measurement of strain and temperature of structures using fibre optic sensor J. Intell. Mater. Syst.Ramakrishnan M, Rajan G, Semenova Y, Farrell G and Materials C 2016 Overview of fiber optic sensor technologies for strain/temperature sensing applicationsDesigned for Harsh Environments. Proximion design and produce complete temperature monitoring systems including interrogator and analysis software.Simultaneous Measurement of Strain, Temperature, and Vibration Frequency Using a Fiber Optic Sensor. Hyun-Kyu Kang, Hyung-Joon Bang,. Chang-Sun Hong.K. T. V. Grattan and T. Sun, Fiber optic sensor technology: an overview, Sens. Actuators Grating/Long Period Fiber Grating Sensor for Strain/Temperature Keywords: fiber optic sensor composite materials strain/temperature sensing smart materials structural health monitoring. 1. Introduction.PRIVATE AND CONFIDENTIAL. 1. OZ Optics Limited. FIBER OPTICS DISTRIBUTED STRAIN AND. TEMPERATURE SENSOR (DSTS). May 2017The base of time-of-flight fiber optic sensors using short laser pulses was the system iscapable of measuring of temperature and force acting on the fiber.Kang H K, Ryu C Y, Hong C S and Kim C G 2001 Simultaneous measurement of strain and temperature of structures using fiber optic sensor J. Intell. Mater. Syst. fiber optic sensing provides to SHM systems. .. to measure strain and temperature distribution based on the Brillouin scattering effect [50]. Applications of Fiber Optic Sensors in Engineering Mechanics Previous chapter Strain and Temperature Measurement Using Optical Fiber.