Abstract Template

Abstract Title: Multiple-parameter optical sensing based on a fiber laser source and fiber gratings family

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Abstract (244 words)

Fiber sensing technologies have been extensively used in fields such as petroleum mining, vibration, pressure, acceleration, flow, strain measurement and so on. Among the current fiber optic sensing systems, fiber Bragg grating (FBG)-based sensor may be the most favorable one thanks to its real-time and remote sensing ability. In a fiber-laser-based FBG sensing system, the laser cavity forms part of the FBG sensor. Therefore, the changes in the FBG physical condition can be detected directly through the laser wavelength. The dynamic range of fiber laser sensor is equivalent to the cavity length. In this talk, several multi-wavelength fiber sensing systems will be designed and demonstrated. The light source could be a semiconductor optical amplifier (SOA) or a fiber amplifier. A linear-cavity fiber laser, for example, is a good candidate. In the linear cavity fiber laser, the rear cavity end may be designed with a 2 × 2 fiber loop mirror, broadband fiber mirror or a 3-port optical circulator; while the front cavity end may be designed with a FBG. The characteristics and sensor performances will be demonstrated and evaluated under different sensing distances and parameters. The results show that the laser sensor array possesses a dynamic sensing distance up to 40 km, while stress, temperature, strain and pressure detection were successfully measured at the same time. An array waveguide grating (AWG) integrated with an optical switch, with merits of reliability and stability, is also used to construct a multiple fiber sensing array for comparison.

Keywords—*fibre sensing, fibre grating, fiber laser, fiber amplifier*

Professional Biography (149 words)

Shien-Kuei (Peter) Liaw received double doctorate degrees from National Chiao-Tung University in photonics engineering and from National Taiwan University in mechanical engineering, respectively. Prof. Liaw joined the National Taiwan University of Science and Technology (NTUST) in 2000. He has since been the Director of both the Optoelectronics Research Center and the Technology Transfer Center there. He was a visiting researcher at Bellcore (now Telcordia), USA in 1996 for six months and a visiting Professor at University of Oxford, UK for three months in 2011.

He has forty U.S./Taiwan patents and more than 250 journal articles and international conference presentations. He has been actively contributing for many conferences as technical program chair, international advisory committee and/or keynote speaker. Currently, Dr. Liaw is a distinguished Professor at National Taiwan University of Science and Technology, President of the Optical Society (OSA) in Taiwan Chapter and the Secretary-General of the Taiwan Photonic Society.



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