Symposium Speaker	
Full Name	Marcelo A. Soto
Affiliation	Universidad Técnica Federico Santa María (Valparaíso, Chile)
Presentation Title	Distributed Brillouin optical fibre sensing with a 100-fold reduced measurement time

Biography

Marcelo A. Soto received his M.Sc. degree in Electronic Engineering (major in Telecommunications) from Universidad Tecnica Federico Santa Maria, Valparaiso, Chile, in 2005; and his Ph.D. degree in Information and Communication Technologies from Scuola Superiore Sant'Anna, Pisa, Italy, in 2011. Since March 2018, he is an Assistant Professor in the Department of Electronic Engineering at Universidad Técnica Federico Santa María, Valparaiso, Chile. Previously he was a Postdoctoral Researcher in the Group for Fibre Optics at EPFL Swiss Federal Institute of Technology of Lausanne, Switzerland, where worked on high-performance Brillouin and Rayleigh distributed fibre sensing, nonlinear fibre optics, optical signal processing, and optical Nyquist pulse generation. Dr. Soto is author or co-author of about 140 scientific publications in international refereed journals and conferences, 3 book chapters and 8 patents. He is member of the Optical Society of America (OSA) and member of the Review Board of major international journals in optical fibre sensing and photonics.

200 words abstract

Brillouin optical time-domain analysis (BOTDA) exploits the interaction between a pulsed pump and acontinuous-wave probe, both counter-propagating over a sensing fibre. Scanning the pump-probe frequency offset is required to measure the Brillouin gain spectrum (BGS) at each fibre position, and then to retrieve by post-processing the gain peak frequency containing local temperature and strain information. The BGS scanning is normally performed over a few hundred MHz, with 1-2 MHz steps; being a time-consuming process that leads to typical measurement times of a few minutes. This feature limits classical BOTDA to quasi-static measurements only. Here a novel BOTDA approach, based on a closed-loop control system, is discussed. The technique eliminates the classical BGS scanning, allowing for a precise determination of the Brillouin frequency profile over tens of kilometres by reading the output of a closed-loop controller with no need of post-processing. Compared to standard BOTDA, this tracking method demonstrates a measurement time reduction of two orders of magnitude, enabling acquisitions in a couple of seconds with no compromise of the measurand uncertainty. Overcoming limitations imposed by instrumentation, the method offers the possibility of km-range sensing with sub-second measurement time, reaching an unmatched favorable trade-off between measurand accuracy and closed-loop delay.