VIAVI Solutions

NITRO Fiber Sensing Technical References

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Introduction

This document provides a set of links to scientific and technical papers that explore the technical principles and present real-world use cases of VIAVI's distributed fiber optic sensing instruments and solutions, including Distributed Temperature Sensing (DTS), Distributed Temperature and Strain Sensing (DTSS), and Distributed Acoustic Sensing (DAS). The referenced materials span multiple application domains (e.g., geotechnical and environmental monitoring, structural health monitoring, and telecom networks) and are intended to support deeper understanding of system capabilities, deployment considerations, and data-driven insights.

Key applications covered

- Geotechnical and environmental monitoring, including ground movement/instability, subsurface strain, and temperature profiling in boreholes, geothermal networks, and subsea environments.
- Structural health monitoring of civil infrastructure (e.g., bridges and post-tensioned elements), supporting long-term strain/force tracking, deformation assessment, and early warning of abnormal behavior.
- Telecom network monitoring with distributed acoustic sensing (DAS), enabling asset protection and situational awareness (e.g., third-party interference detection) and providing data streams for AI/ML-driven analytics.
- Multi-parameter sensing and calibration methods to separate and interpret temperature and strain effects, improving measurement confidence across deployment conditions.

Geotechnical & Environment

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- Allan L. et al. All optical multi-sensor well monitoring system to survey and monitor gas storage operations. International Pipeline Conference. Vol. 86588. American Society of Mechanical Engineers, 2022. December 2022.
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- Sidenko E. et al. Influence of interrogators design on DAS directional sensitivity. EAGE Workshop on Fiber Optic Sensing for Energy Applications in Asia Pacific 2020. European Association of Geoscientists & Engineers. November 2020.

Structures

- Madhubhashitha H. et al. Evaluation of Bending Deformations in Slender Cylindrical Structures Using Distributed Optical Fibre Strain Sensing. Sensors 2025, 25, 7366. 3 December 2025.
- Williams C.S. et al. Optical Fiber Sensor-Embedded Strands for Long-Term Monitoring of Post-Tensioned Tendons in Bridge Elements. US Department of Transportation, Perdue University. 1 June 2024.
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Other

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