Principle of Residual Strain in Optical Cables

Overview

Residual elastic strains are local deformations resulting from residual stresses, which are stresses inside the fiber that persist even when no external forces are applied to the fiber. Residual elastic stresses and strains are important primarily because they perturb the fiber's refractive index. This study investigates the strain transfer mechanism for different types of fiber optic cables while embedded in concrete cubes, sustaining a boundary condition which features a displacement discontinuity. Understanding the strain transfer mechanism is required to interpret strain sensing results for fiber optic cables. INTRODUCTION Optical fibers are drawn with resin coatings that protect the glass. The residual stress profile arises from a thermal expansion mismatch of the constituent materials, the tension applied during fiber forming, and the thermal profile experienced by the fiber. non-destructive experimental procedure is presented which enables the determination of residual thermal stresses in optical fiber preforms. We carry out the measurement of the optical retardation using the traditional Senarmont compensation.

Article Content

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non-destructive experimental procedure is presented which enables the determination of residual thermal stresses in optical fiber preforms. The procedure is based on integrated photoelasticity.

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