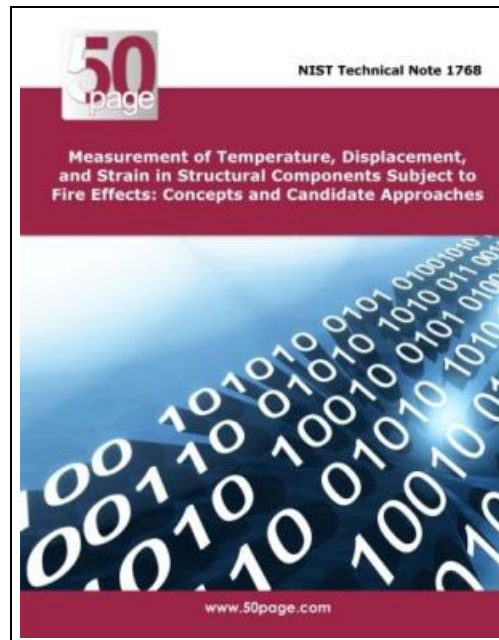


## Measurement of Temperature, Displacement, and Strain in Structural Components Subject to Fire Effects: Concepts and Candidate Approaches (Paperback)



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## MEASUREMENT OF TEMPERATURE, DISPLACEMENT, AND STRAIN IN STRUCTURAL COMPONENTS SUBJECT TO FIRE EFFECTS: CONCEPTS AND CANDIDATE APPROACHES (PAPERBACK)



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Createspace, United States, 2014. Paperback. Condition: New. Language: English . Brand New Book \*\*\*\*\* Print on Demand \*\*\*\*\*. For the last forty years, NIST has led the world in fire metrology through research conducted at the Large Fire Laboratory, which is being expanded to enable experiments on real-scale structures under combined structural and fire loads. The combined capabilities of large fire testing and structural fire testing will be comprised in the National Fire Research Laboratory (NFRL), which is expected to be completed in 2013. Measurements of temperature, displacement, and strain at hundreds of points on a structural system in the fire zone are needed to validate analytical tools for fire conditions. However, the ability to measure the performance of structures during realistic fire exposures is severely limited due to a significant gap in measurement science. At present, temperatures are measured with thermocouples and strains are measured with high temperature strain gages. Each of these sensors requires a separate line for data collection during the experiment. Further, high temperature strain gages are unreliable and often do not perform as expected during fire tests. Significant improvements to structural measurement in fire conditions are needed to advance the validation of analytical tools and performance based design methodologies. Candidate methods for temperature, displacement, and strain measurements that could meet these performance requirements were reviewed. A demonstration test that employed a natural gas burner in the Large Fire Facility evaluated the potential of digital image correlation and high temperature strain gages to measure thermally induced strains. The technology review and the outcome of the demonstration test indicate that digital image correlation and fiber optic methods have great promise for temperature, displacement, and strain measurement. A four-stage development plan is proposed to overcome these challenges.



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