

# **IMAGE-BASED STRAIN ANALYSIS ON CEMENT-BASED MATERIALS**

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**Master of Science in Chemical Engineering**

## **AN ABSTRACT OF A THESIS**

A meso-scale image-based technique developed for measuring displacement in cement-based material under uniaxial compression is outlined. The samples were loaded up to 5000 psi at 1250 psi increments. An image was taken in an optical microscope before the load (reference) and after the load (deformed) was applied. Using Matrox Inspector 4.1, pixels or groups of pixels were defined in the reference image and found in the deformed image. The resulting displacements were used to define a type of engineering strain from pixel to pixel. Results suggest that this technique is sensitive for strains as small as  $10^{-4}$ . The sample, however, must exhibit grayscale variation for this technique to function. Average pixel displacements were calculated for hydrated portland cement samples as well as low aggregate volume fraction mortars, and the results are repeatable. The results were compared to those from an x-ray diffraction technique and the strain results for both techniques are in good agreement.

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A Thesis

Presented to

the Faculty of the Graduate School  
Tennessee Technological University

by

Jeremiah W. Batiste

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In Partial Fulfillment  
of the Requirements for the Degree

**MASTER OF SCIENCE**

Chemical Engineering

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August 2006

**CERTIFICATE OF APPROVAL OF THESIS**

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