As mentioned in the administrative handouts, each student was required to make a final oral presentation that was scored collectively by the instructor and fellow class members.

A cover letter and a description of the topic to be presented was due mid-semester. Samples of these as well as a copy of the Oral Presentation Evaluation Sheet follow.

Robert E. Vaughan
National Aeronautics and Space Administration
George C. Marshall Space Flight Center
MSFC, Alabama 35812
October 22, 2004

Dr. John A. Gilbert
Department of Mechanical and Aerospace Engineering
University of Alabama in Huntsville
Huntsville, Alabama 35899

Dear Dr. Gilbert:

Enclosed please find a copy of the abstract for an oral presentation entitled, "Analysis of Graphite Reinforced Cementitious Composites." The work is being submitted as part of the academic requirements for MAE 459/559, Characterization of "STAR" Structures.

If you have any questions or comments on the enclosed, I can be reached by telephone at (256) 705-9658. My e-mail address is bob.vaughan@msfc.nasa.gov.

Thank you in +advance for your kind consideration. I look forward to making my presentation later this semester.

Sincerely,

Robert E. Vaughan

Analysis of Graphite Reinforced Cementitious Composites

by

Robert E. Vaughan
National Aeronautics and Space Administration
George C. Marshall Space Flight Center
MSFC, Alabama 35812

Abstract

Strategically embedding graphite meshes in a compliant cementitious matrix produces a composite material with relatively high tension and compressive properties as compared to steel-reinforced structures fabricated from a standard concrete mix. Although these composite systems are somewhat similar, the methods used to analyze steel-reinforced composites often fail to characterize the behavior of their more advanced graphite-reinforced counterparts.

This paper describes some of the analytical methods being developed to determine the deflections and stresses in graphite-reinforced cementitious composites. It is initially demonstrated that the standard transform section method fails to provide accurate results when the elastic moduli ratio exceeds 20. An alternate approach is formulated by using the rule of mixtures to determine a set of effective material properties for the composite. Tensile tests are conducted on composite samples to verify this approach; and, when the effective material properties are used to characterize the deflections of composite beams subjected to pure bending, an excellent agreement is obtained.

Laminate composite plate theory is also investigated as a means for analyzing even more complex composites, consisting of multiple graphite layers oriented in different directions. In this case, composite beams are analyzed using the effective material properties established from tensile tests; and, finite element modeling is used to verify the results. Considering the complexity of the samples, a very good agreement is obtained.

MAE/CE 459/559 - ORAL PRESENTATION EVALUATION SHEET - Fall '04

Speaker(s): Lawrence Binek

Key: SA = Strong Agreement; A = Agreement; PA = Partial Agreement; D = Disagreement; SD Strong Disagreement

Visuals (slides, overheads, video, board, etc.)	SA	A	PA	D	SD
1. The overall quality of the visuals was good.					
2. The overall content of the visuals was good.					
3. The visuals were relevant to the lecture.					
4. The visuals were well organized.					
Delivery	**SA**	**A**	**PA**	**D**	**SD**
1. The overall delivery was good.					
2. The speaker was well prepared.					
3. The speaker related well to the audience.					
4. The speaker clearly defined their objective.					
6. The speaker adequately described the topic.					
7. The speaker adequately addressed questions.					
Format and Content	**SA**	**A**	**PA**	**D**	**SD**
1. The presentation was well organized.					
2. The overall content of the presentation was good.					
3. The presentation stimulated interest in the subject.					
4. The allotted time was used adequately and effectively.					
5. The subject matter was applicable to the course.					