



Research Assignment - 2008

Principal Investigator H. N. Hashemi

Title Professor

College/Department Engineering/Mechanical and Industrial Eng.

Email hamid@coe.neu.edu

Office address 251 SN

Office phone 617-373-5515

Lab address 16 FR

Lab phone 617-373-8543

Title of research assignment

Effects of crack (Damage) patterns of the vibration and Mechanical properties of components

Research abstract

Structural components are often subjected to cyclic loadings and various hazardous environmental conditions. These loadings and environmental conditions lead to degradations of these components. The degradation could be in form of multiple cracks, stress corrosion cracking, corrosion, etc. The structural integrity of these components depends on the distribution of these damages throughout the component. For two damages far apart from each other, the structural integrity is controlled by the worst damage. However, for two damages that are close to each other, the structural property is controlled by both damages.

In this research we are interested to understand effects of different crack pattern distributions on overall structural integrity of the component. In order to understand the effect of damage pattern on the overall structural integrity of components, various specimens with different crack patterns will be manufactured. Before conducting any destructive test, we will investigate the effect of these patterns on the vibration characteristic of these components. Destructive test will be followed upon completion of vibration tests. Furthermore we will induce identical damage by impacting specimens at different locations. The material for this part of experiment will be metal matrix composites. We will try to characterize damage by using Scanning electron microscope. The effects of these damages on vibration characteristic, damping behavior and mechanical properties of components will be investigated. We will also try to simulate the effect of these defects on the vibration characteristics of these components by using commercial software ANSYS.

Research activities/experience

We will prepare all necessary samples and will show students how to use equipment. We expect these students to make a good record keeping of all aspects of the experimentation. This is extremely important for good understanding of the subject and our research results.

Expectations of RET

We expect the participants to do a good literature survey and provide a write up of the past research results on the subject.

Special skills or interests that would help a YSP participant with this assignment (i.e., an interest in physics, experience with specific laboratory equipment, etc.)

Laboratory data acquisition, Familiarity with Excel and MS word is essential.

Lab safety/issues unique to this laboratory. A general Lab Safety Overview will be presented by Environment Health and Safety to both RET and YSP participants prior to the beginning of lab assignments.

Students should comply with the general lab safety. The lab safety information will be given to students.

Suggested literature to be reviewed prior to beginning this research assignment.

Please review some books on mechanical behavior of material, especially simple tensile tests, and review some elementary materials on vibration and damping of the materials.

Research/Lab Summer Hours	8:30 a.m. – 4:30 p.m.	<input checked="" type="checkbox"/> Monday through Thursday		
		<input type="checkbox"/> Monday through Friday		
Scheduled Research/Lab Meetings	10:30 a.m. – 11:30 a.m.	<input type="checkbox"/> Daily	<input type="checkbox"/> Wednesday	<input type="checkbox"/> To be determined
		<input checked="" type="checkbox"/> Monday	<input type="checkbox"/> Thursday	
		<input type="checkbox"/> Tuesday	<input type="checkbox"/> Friday	

Lab/research project URL

Research/Lab Supervisor Students will work with the graduate student Nicholas Yang and will be in touch with me if there are some issues. I will also check with them on the daily basis.

Email nhyang@coe.neu.edu

Phone 617-373-8543

Research/Lab Assistant

Email

Phone