

**DEPARTMENT OF AEROSPACE ENGINEERING AND ENGINEERING
MECHANICS
College of Engineering**

**SUMMER RESEARCH OPPORTUNITIES
FOR UNDERGRADUATE WOMEN**

APPLICATION DEADLINE: MARCH 3, 2003

The Department of Aerospace Engineering and Engineering Mechanics is pleased to offer the following research project(s) for the summer of 2003. Interested students are urged to contact the faculty member(s) directing the project(s) that most interest them. By contacting the faculty member, you can discover more about the project, learn what your responsibilities will be, and if possible, develop a timetable for the twelve-week research period.

Nondestructive Characterization of Creep Damage in Nickel-Base Superalloys

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Creep damage is the slow, continuous deformation in materials subjected to long-term stresses. Elevated operational temperatures greatly exacerbate the process, therefore this type of damage is often associated with different applications of gas-turbine technology. In this project, nickel-base superalloy tensile coupons representing different stages of creep damage ranging from intact to fractured will be provided by the General Electric Corporate Research Center of Schenectady. These coupons will be tested for creep-induced anisotropy using a high-frequency eddy current electrical conductivity tester. Creep damage causes microscopic crystallographic defects in the material that perceptibly reduce the electrical conductivity of the material, especially in the direction normal to the maximum plastic strain. This effect can be nondestructively detected by measuring the electrical conductivity along different directions and evaluating the resulting polar diagrams that represent the conductivity profile of the material. A special elliptical probe will be used to measure the eccentricity of the conductivity profiles as the specimens will be rotated. The accumulated data will be statistically analyzed and the degree of correlation between creep damage and conductivity anisotropy will be determined. The results of this study will be summarized in a detailed progress report.