

Department of Aerospace Engineering and Engineering Mechanics
COLLEGE OF Engineering

**SUMMER RESEARCH OPPORTUNITIES
FOR UNDERGRADUATE WOMEN**

APPLICATION DEADLINE: March 3, 2008

The Department of Aerospace Engineering and Engineering Mechanics is pleased to offer the following research project for the summer of 2008. Interested students are urged to contact the faculty member(s) directing the project that most interests 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 plastic deformation in nickel-base superalloys

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Project Description

It has been found recently that, in contrast with most other materials, surface-treated nickel-base superalloys exhibit an apparent increase in electrical conductivity, which can be exploited for nondestructive assessment of subsurface residual stresses. The reason why nickel-base superalloys, which are often used in the most critical gas-turbine engine components, lend themselves easily for eddy current residual stress assessment lies in their unique physical properties, namely that their electrical conductivity strongly increases under compression. The exact reason for this unusual behavior is presently unknown, therefore experimental data is needed in such popular nickel-base superalloys as IN100, IN718, and Waspaloy to better understand effect of residual stress build-up and its relaxation behavior at elevated service temperature. The proposed task requires alternating eddy current conductivity measurements and thermal exposure experiments to monitor residual stress relaxation under various conditions in these engine materials. This effort is part of a five-year research effort supported by the Department of Air Force conducted in close collaboration with the Air Force Research Laboratory.