

VISITOR RESEARCH REPORT

Visitor Name: Mr. Benedikt Kriegesmann

Area of Research: *Buckling Processes of Cylindrical Shells under Axial Loading*

Period of Visit: March 28, 2011 – April 20, 2011

Goal:

A three month research stay last year antedated the current stay. Hence, one of the goals of the current stay was to extend the work of last year and to prepare a publication about results achieved last year.

The overall topic of the research is to contribute on the development of new design procedures for axially compressed cylindrical shells, as it is the goal of the Shell Buckling Knockdown Factor (SBFF) project, headed by Mark W. Hilburger and funded by the NASA Engineering and Safety Center (NESC).

Within the current stay, the special focus was on assembled cylinders. Metallic cylinders assembled from several panels show high imperfection sensitivity especially at the weld seams. Hence, the goal was to extend new design method to assembled cylinders and to investigate the special influence of the imperfections induced by welding process.

Strategy:

For determining the influence of welding induced imperfections on the buckling load of cylindrical shells, numerical simulations of the perfect shell and simulations of shell including typical welding induced imperfections were performed and parameter studies concerning pattern and amplitude of these imperfections were executed.

Accomplishments:

An existing preprocessor was extended to enable the automated generation of Finite Element models of assembled cylindrical shells, including welding induced imperfection as well as “classical” geometric imperfections of the panel skin. First parameter studies have been executed and evaluated. However, no general conclusions can be reported so far.

Future Work:

The parameter studies on the effect of weld imperfection will be continued. Furthermore, a probabilistic approach especially tailored to assembled cylinders is about to be developed. First ideas have been derived and will be implemented in the near future.

Pending Publications:

The work of last year’s research stay is planned to be published in a NASA report with the working title: “Influence of Multiple, Local Perturbations and Imperfections on the Buckling Load of Axially Compressed Cylindrical Shells.”

Seminar Presented:

A presentation with the title “Design Optimization of Composite Cylindrical Shells under Uncertainty” was given.