



# SEMINAR

APPLIED MATHEMATICS AND MECHANICS

FS919

6 June 2017

A DCAMM seminar No. 710 will be presented by

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**National Institute of Aerospace and**  
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The title of the lecture is

**Face Sheet/Core Disbonding in Sandwich Composite Components:  
A Road Map to Standardization**

**Abstract:**

Typical damage modes in light honeycomb sandwich structures include facesheet/core disbonding and core crushing, both of which pose a threat to the structural integrity of a component. These damage modes are of particular interest to certification authorities since several in-service occurrences, such as rudder structural failure and other control surface malfunctions have been attributed to disbonding. Extensive studies have shown that facesheet/core disbonding can lead to damage propagation caused by internal pressure changes in the core due to ground-air-ground (GAG) cycles. Future composite structure applications, including for instance, composite sandwich construction of the fuselage of business jets that experience higher altitudes than transport aircraft, are also driving a need to understand the phenomenon of disbond growth under generalized load conditions including maneuvers and gust conditions.

In order to identify, describe and address the phenomenon associated with facesheet/core disbonding, a reliable means of characterizing facesheet/core disbonding must be developed. In monolithic laminates, delamination is typically characterized by measuring a critical strain energy release rate,  $G_c$ . A similar approach is proposed here, whereby  $G_c$  for facesheet/core disbond initiation is measured for a sandwich composite of the type typically applied in aircraft. However, unlike delamination in unidirectional monolithic laminates, facesheet/core disbonding in a sandwich will not necessarily be confined to a particular interface. Studies have shown that disbond growth location can be significantly affected by parameters such as core thickness, facesheet thickness, mode-mixity and crack driving force. Characterization tests must therefore be developed that ensure that disbond growth occurs at the location observed in service. In addition to the characterization tests, analysis tools are required, to help assess the likelihood of a structure exhibiting critical disbonding. These analysis tools need to be verified and validated.

In this presentation, a road map on standardization efforts for face sheet/core disbonding in sandwich composite components is presented. An overview is given on the development of test methods that yield a critical strain energy release rate associated with disbonding, with a focus on mode-I dominated loading conditions. Further, the analysis of a honeycomb sandwich panel containing a circular disbond at one face sheet/core interface is discussed.

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| DATE:  | <b>Tuesday, 20 June 2017</b>                                                 |
| TIME:  | <b>9:00 – 9:45 + questions</b>                                               |
| PLACE: | <b>Auditorium 074, Building 421,</b><br>DTU, Technical University of Denmark |

Danish pastry, coffee and tea will be served 15 minutes before the seminar starts.

All interested persons are invited.

Niels Leergaard Pedersen

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