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**Delamination of Compressed thin Layers at Corners**

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### Modeling of the degradation of laminates under impact: some key points

*Olivier Allix*,[†] Jean-Mathieu Guimard and Nicolas Feld
*École Normale Supérieure de Cachan, France*[†]

The presentation is focused on some key aspects of the meso-modeling of the deterioration mechanisms of long fiber laminates under impact. The first aspect concerns the coupling between transverse crack and delamination, this coupling in fact mainly determines the damage pattern in case of low-velocity impact. The two other aspects are related to the modeling of fragmentation under dynamic compressive loading and the modeling of rate effect for delamination crack propagation. The absorption of energy under higher velocities strongly depends on a competition between those two mechanisms.

### Delamination of compressed thin layers at corners

*Johan Clausen*,[†] Henrik Jensen and Kim Sørensen
*Aalborg University, Denmark*[†]

An analysis of delamination for a thin elastic film, attached to a substrate a corner, is carried out. The film is in compression and the analysis is performed by combining results from fracture mechanics and the theory of thin shells. The results show a very strong dependency of the angle of the corner. In contrast with earlier results for delamination on a flat substrate, the present problem is not a bifurcation problem. It is asserted whether crack growth is most likely to take places in the direction parallel to the corner or in the direction perpendicular to the corner. It is found that this behaviour is very much influenced by the magnitude of frictional stress between crack faces in contact.

### Multiple curved micro-beams model for in-plane mechanical properties of stitched composite laminates

*Junqian Zhang*[†] and Yuqing Wei
*Shanghai University, China*[†]

Four meso-structural parameters such as distortion length, distortion width, minor axis and major axis of stitch hole are introduced to characterize the local in-plane fibre configuration around the stitches. A fibre distortion model (FDM) is developed based on the investigation of typical morphology to describe the in-plane fibre misalignment angle and inhomogeneous fibre content using the meso-structural parameters. A multiple curved micro-beam model considering the interaction of adjacent fibres is established. In this model the fibres are represented by curved Euler-Bernoulli beam and deform in both axial extension and in bending. Two failure modes such as fibre fracture and matrix shear failure are considered. The tensile failure process is simulated using the unified multiple curved micro-beam model, coupling with Monte-Carlo simulation technique.

### The characterization of interface adhesion of dissimilar elastic-plastic materials by a pressurized blister test modeling

*Yichun Zhou*[†] and Limei Jiang
*Xiangtan University, China*[†]

A concept of the interface adhesion energy, has been proposed to characterize the quality of interface adhesion of the elastic-plastic materials system. A geometrically nonlinear finite element analysis of a blister test of an elastic-plastic film bonded to an elastic-plastic substrate has been conducted.