Delft University of Technology

Aerospace Structures & Computational Mechanics
Ph.D. Seminar Series

Yujie Guo

Nitsche's Method for a Blended Coupling of Isogeometric Shell Structures

Thin shell structures are widely used in the aerospace, automotive and mechanical engineering industries. They are ideal candidates for the isogeometric analysis paradigm profiting from the smoothness of the geometry model, and the higher order approximation and higher continuity properties of NURBS. To model complex shell structures which need to be assembled from multiple patches, the bending stiffness should be maintained across the patch interfaces. We propose a variationally consistent weak coupling method for thin-walled shell patches. The method overcomes the need for C^1-continuity along the patch interface to ensure a corresponding geometric continuity in the deformed configuration and a correct transfer of bending moments across the interface. Importantly, it allows a blended coupling of shells based on different mathematical models, e.g. Kirchhoff-Love and solid-like shell models. The proposed approach retains the high level of accuracy of single patch solutions and reveals its potential for authentic multi-patch NURBS modeling. We illustrate the good performance of the method for pure Kirchhoff-Love shell models and blended shell models with various examples. The presented approach supports local model refinements where e.g. full 3D stress states are of interest, and further opens the door for the coupling of laminated composites belonging to different lamina theories.

time:	Thursday, September 18th, 2014, 16:00
location:	meeting room 7
organization:	Dr. Martin Ruess ‹m.ruess@tudelft.nl›