KOLLOQUIUM ÜBER NEUERE ARBEITEN AUF DEM GEBIETE
DER MECHANIK UND STRÖMUNGSLEHRE
an der Technischen Universität Wien

# EINLADUNG

zum Vortrag von Herrn

## Assistant Prof. Dr. Boyang Chen

Aerospace Structures and Computational Mechanics, TU Delft

über

## "High-fidelity modelling of progressive damage and failure in fibre-reinforced composites - Floating Node Method and C1 Cohesive Elements"

**Zeit:** Dienstag, 3. Dezember 2019, 15:00 Uhr

**Ort:** GM 4 Knoller Hörsaal, Raumnummer BD 02D32
Getreidemarkt 9, BD Hoftrakt, 2. Stock, 1060 Wien
Institut für Leichtbau und Struktur-Biomechanik

*Prof. Dr. Ch. Bucher*
*Prof. Dr. J. Eberhardsteiner*
*Prof. Dr. Stefanie Elgeti*
*Prof. Dr. Ch. Hellmich*
*Prof. Dr. M. Kaltenbacher*
*Em.Prof. Dr. A. Kluwick*
*Prof. Dr. M. Krommer*
*Prof. Dr. H.C. Kuhlmann*

*Em.Prof. Dr. P. Lugner*
*Em.Prof. Dr. H. Mang*
*Em.Prof. Dr. F. Rammerstorfer*
*Em.Prof. Dr. W. Schneider*
*Em.Prof. Dr. H. Sockel*
*Prof. Dr. A. Soldati*
*Em.Prof. Dr. H. Springer*
*Prof. Dr. Ph.J. Thurner*

# High-fidelity modelling of progressive damage and failure in fibre-reinforced composites – Floating Node Method and C1 Cohesive Elements

**Boyang Chen**

TU Delft

The high number of matrix cracks and delamination often pose a challenge for the high-fidelity numerical modelling of the progressive failure process of fibre-reinforced composites. While remeshing is not practical with hundreds of cracks, smeared approaches become popular with composites modelling. However, the intriguing interactions and competitions between matrix cracks and delamination cannot be accurately captured once the matrix cracks get smeared – the prediction of such mechanisms would require the kinematics of the matrix crack/delamination intersections to be explicitly represented (i.e., as sharp cracks and not as smeared zones or bands) in the model. In this talk, the Floating Node Method (FNM) will be presented which addresses this challenge by enriching the finite element formulation with additional geometrical connectivities, additional degrees of freedom and self-partitioning capabilities. The FNM will be demonstrated on problems such as open hole tension and delamination migrations. In addition, a novel cohesive element technology will also be presented which overcomes the cohesive zone limitation on the size of cohesive elements, where cohesive elements several times larger than the cohesive zone (as opposed to being several times smaller) can be used for accurate modelling of delamination between composite plies.