



UNIVERSITÀ DEGLI STUDI  
DI TRENTO

Dipartimento di Ingegneria Civile,  
Ambientale e Meccanica



Instabilities and nonlocal  
multiscale modelling of  
materials

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## AVVISO DI SEMINARIO

Si comunica che **martedì 23 maggio 2017 a partire dalle ore 11.00**  
si terrà presso l'aula **R2** (via Mesiano 77) il seguente seminario

# Modelling of Forming of 3D Textile Reinforcements for Composites

**Prof. Valter Carvelli**

*Politecnico di Milano*

Composite components with complex shapes are generally obtained by liquid molding processes due to short cycle times and ability to yield net-shape parts. The first stage of such processes consists in forming a dry fabric reinforcement, before resin injection and consolidation. The final properties of the composite component are largely established during the shaping. Therefore, knowledge of the material behavior and production parameters during such a process is important for the successful manufacturing of a composite preform without macroscopic defects.

Different numerical models have been developed for the shaping process of 2D composite reinforcements. Only few studies have been dedicated to three-dimensional interlaced fabrics.

The talk is devoted to a constitutive model for large deformation analyses of 3D woven textiles. This is an extension of a previously developed for 2D fabrics.

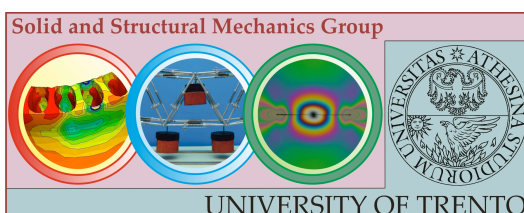
The model considers as main deformation modes occurring during shaping processes of 3D textile reinforcements: stretch in the warp and weft direction; transverse compaction; in-plane shear; transverse shear in the warp and weft direction. For each deformation mode, a strain energy density function is defined and relevant parameters are based on the experimental behavior of the reinforcement.

The constitutive model was implemented in an explicit commercial finite element code and its accuracy was first assessed by comparing experimental and numerical main deformation modes and then the forming of a non-crimp 3D orthogonal woven reinforcement. The numerical results point out the capability of the constitutive model to predict the mechanical behavior of the non-crimp 3D reinforcement during complex shaping and the possible further improvements of the model.

Tutti gli interessati sono invitati a partecipare.

Il seminario è organizzato dal gruppo di Scienza delle Costruzioni

(D. Bigoni, L. Deseri, N. Pugno, A. Piccolroaz, F. Dal Corso, M.F. Pantano, R. Springhetti, D. Misseroni)



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