

**20 & 21 September 2023 - International Conference on Composites / Advances in  
Composite Structures and Materials**

Tailoring Woven Structures to Enhance Drapability in Single-Layer Fabrics

*Amanda Kulesa M.Sc. (ITA - RWTH), Dr Yuyuan Shi (Northumbria University) Professor Thomas Gries (ITA – RWTH)*

My abstract refers to a proposal for a:

Lecture

Poster

The field of fiber reinforced composites (FRC) is ever-expanding with a wide range of applications and possibilities to meet the increasing need for complexly formed final components. Due to their stability, tailor-ability, ease of handling and ubiquitous availability, woven fabrics are one of the preferred textiles for use in FRC. However, very little research has been performed regarding the effect of combined woven structure on the drapability of the final product.

In the production of fiber reinforced composites, the woven fabrics are often draped over or in various forms and molds to achieve the desired shape of the final component. Due to the nature of this generally manual process, unwanted material wrinkling, fiber misalignment and textile force distortion often occur. In this project, different techniques of counteracting these pitfalls are explored purely through exploiting existing woven structures available through industrial weaving machines. The initial approach examines the effects of combining woven structures on the drapability of a single layer fabric, aiming to achieve a dome shaped textile while preventing wrinkling and fiber distortion. It is accomplished through a combination of various woven structures including plain weave, twill and basket weaves. The samples will be woven using a jacquard shedding mechanism with various materials, dimensions and patterns. The resulting samples are then measured, categorized, and tested for dimensionality, fiber displacement and stability.