

SEVENTH WORLD CONFERENCE ON 3D FABRICS AND THEIR APPLICATIONS

8-9 September 2016, ENSAIT, Roubaix, France

ABSTRACT FORM

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I wish to present a paper/poster (please indicate preference): abstract attached below.

Title of abstract: Real Scale Single Yarn Impact Modelling through Discrete Elements Method

Please tick the boxes below only if they are relevant.

I wish to receive the detailed information on the Seventh World Conference on 3D Fabrics and their Applications. [Information will be sent automatically if you have submitted an abstract.]

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Closing date for submissions intended for oral presentation is 31 March 2016.

Since the first applications of multifilament models in the beginning of the last decade, few examples of this type of analyses have been presented in literature. This work deals with the real scale simulation of a single yarn subjected to transverse impact using a revisited form of the Discrete Element Method, Illustration 1. Inspired by the models previously developed by other authors, this approach makes possible to perform microscopic analyses in a more efficient computational environment. Transverse impact analysis onto a single yarn has been performed using this approach. One-dimensional elements have been adopted to discretize yarn filaments instead of heavy computational 3D finite elements. A good agreement with literature results has been found with a drastic computational time reduction. This is the first step for larger scale simulations in which multifilament model will be applied even into 3D and 2D fabrics subjected to ballistic impact, Illustration 2. This will be very helpful in clarifying the damage mechanics of these particular materials.

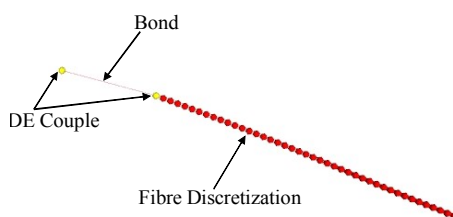


Illustration 1: Fibre Discrete Element Model

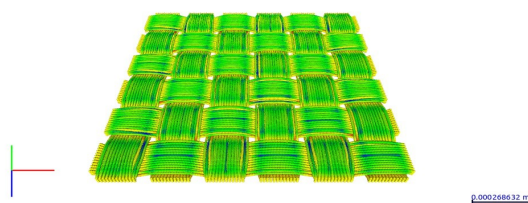


Illustration 1: Balanced Plain Weave Modelled with Discrete Elements