Material Characterization of Medical Grade Woven Bio-Fabric for Use in ABAQUS *FABRIC Material Model

Authors : Lewis Wallace, William Dempster, David Nash, Alexandros Boukis, Craig Maclean

Abstract : This paper, through traditional test methods and close adherence to international standards, presents a characterization study of a woven Polyethylene Terephthalate (PET). Testing is undergone in the axial, shear, and out-of-plane (bend) directions, and the results are fitted to the *FABRIC material model with ABAQUS FEA. The non-linear behaviors of the fabric in the axial and shear directions and behaviors on the macro scale are explored at the meso scale level. The medical grade bio-fabric is tested in untreated and heat-treated forms, and deviations are closely analyzed at the micro, meso, and macro scales to determine the effects of the process. The heat-treatment process was found to increase the stiffness of the fabric during axial and bending stiffness testing but had a negligible effect on the shear response. The ability of *FABRIC to capture behaviors unique to fabric deformation is discussed, whereby the unique phenomenological input can accurately represent the experimentally derived inputs.

Keywords : experimental techniques, FEA modelling, materials characterization, post-processing techniques
Conference Title : ICFSSMC 2023 : International Conference on Fabric Structure Systems and Material Characteristics
Conference Location : Paris, France
Conference Dates : September 18-19, 2023