J Material Sci Eng 2017, 6:2 (Suppl)
http://dx.doi.org/10.4172/2169-0022.C1.062

Efficient determination of full range of elastic constants of carbon fiber reinforced laminated composite panels using micro-macro mechanics methods

Umar Farooq and **Peter Myler**
University of Bolton, UK

This paper is concerned with the theoretical predictions of elastic constants of carbon fiber-reinforced laminated composite panels using micro-macro mechanics laws. Applications of fibrous composites are increasing in aircraft industry where prime importance is given to the quality of physical properties before manufacturing and mechanical properties before using them as a structural component. Wide varieties of test methods are available to screen the properties. However, different test methods and setups produce different results. Similarly, majority of the analytical studies in global coordinates neglect influence from coupling deformations. Use of micro-macro mechanics methods is required to include such influence and complement the existing methods. Present work is mainly based on use of micro-macro mechanics laws and influence from deformations to enhance prediction of elastic constants. Experimentally determined constants were related to off-axes properties to develop formulation for two and three-dimension laminates. The formulations were implemented into MATLAB™ code to predict elastic constants. Good agreement was found between analytical and experimental produced values. Consistent results show that full range of properties can be efficiently determined using micro-macro mechanics laws.

uf1res@bolton.ac.uk