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PII: S1359-835X(16)30218-4
DOI: http://dx.doi.org/10.1016/j.compositesa.2016.06.024
Reference: JCOMA 4350

To appear in: *Composites: Part A*

Received Date: 4 November 2015
Revised Date: 28 April 2016
Accepted Date: 30 June 2016

Please cite this article as: Budiman, B.A., Takahashi, K., Inaba, K., Kishimoto, K., Evaluation of interfacial strength between fiber and matrix based on cohesive zone modeling, *Composites: Part A* (2016), doi: http://dx.doi.org/10.1016/j.compositesa.2016.06.024

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Abstract

This paper presents a measurement technique of interfacial strength considering non-rigid bonding on a fiber/matrix interface modeled as a cohesive surface. By focusing on the stress concentration near a fiber crack obtained from a single-fiber fragmentation test, the stress contours in matrix observed by photoelasticity can be related to the interfacial strength by defining a characteristic length. An equation expressing the relationship between the characteristic length on the stress contour and the interfacial strength was derived, and validated using finite element analysis. The primary advantage of proposed measurement technique is that only a single fiber crack, which usually occurs within elastic deformation of matrix, is required for the evaluation of interfacial strength, whereas saturated fiber fragmentation is necessary in the conventional method. Herein, a sample application was demonstrated using a single carbon fiber and epoxy specimen, and an average interfacial strength of 23.8 MPa was successfully obtained.