NEW ADHESIVE STRENGTH EVALUATION METHOD BASED ON THE INTENSITY OF SINGULAR STRESS FIELD

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***Keywords**: Debonding strength, Adhesive joint, Intensity of singular stress field(ISSF), Fracture mechanics*

Abstract

Adhesive joints are extensively used for various manufacturing processes in different industrial sectors. However, different materials properties cause the singular stress field, whose intensity is depending on the adhesive joint geometry. Our previous studies showed that debonding strength can be expressed as a constant value of the critical intensity of singular stress field (ISSF) by using two-dimensional butt joint models. By considering the real specimen geometry, in this study, the ISSFs on the interface side of three-dimensional butt joints are analyzed by varying the adhesive thicknesses. A mesh-independent technique combined with three-dimensional finite element method (FEM) is shown to be useful for evaluating the three-dimensional ISSF. Then, the ISSF distributions on the interface side are compared with the previous two-dimensional results. It is found that the critical ISSF considered 3D geometry is almost constant independent of the adhesive thickness. The validity of two-dimensional modelling is discussed. The usefulness of the proposed new evaluation method is shown for several adhesive joints.

References

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