

Interfacial Fracture Toughness Measurement of New Composite Material SnSb11Cu6/ 20Steel

Yuepeng Gao¹, Janmei Wang¹, and Yuyang Liu¹

¹Taiyuan University of Science and Technology

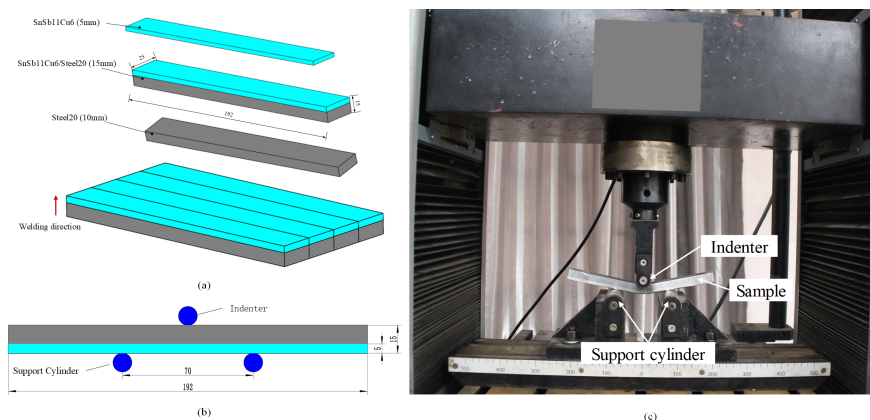
November 5, 2020

Abstract

The interface fracture toughness test of SnSb11Cu6/20steel is realized by three-point bending experimental technique, interfacial cracks are introduced through the overall bending of the composite panel, and the critical energy release rate of 12.07×10^3 J/m² is obtained by calculating the energy released per unit area at the fracture interface. To characterize the stress state of the crack tip, the stress phase angle of the crack tip is calculated using finite element analysis (FEA). At the same time, five sets of FEA experiments are specifically set up to determine the magnitude of the effect of changes in the interface fracture critical load values on the critical energy release rate. The results show that the change in the critical load value affects the critical energy release rate by only 0.08%. And the characterization of the crack tip stress state reveals that the relative strength of the shear stress that drives the interfacial cracking is weaker than that of the positive stress after the crack propagates to a certain length under bending conditions, which also implies that the positive stress is the main reason that drives the interfacial crack to continue propagating when the composite layer is completely fractured.

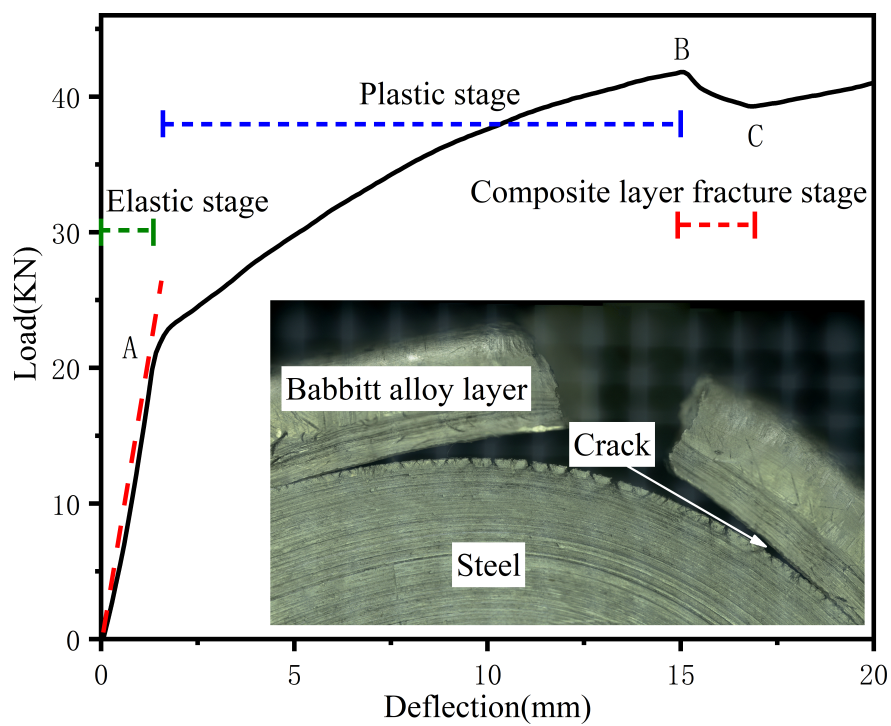
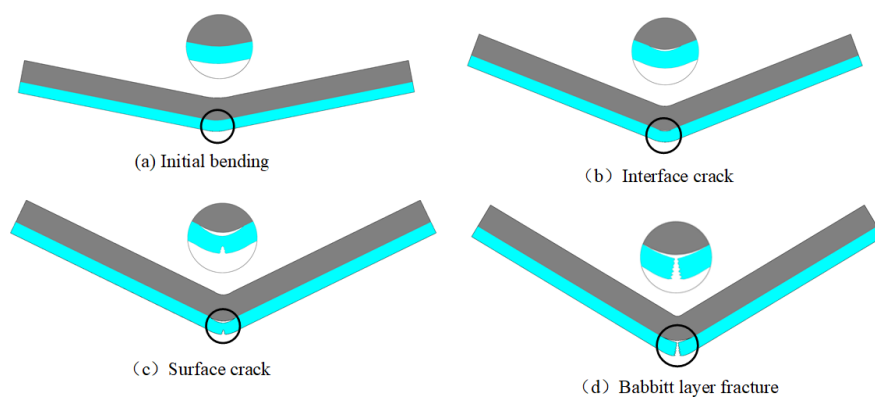
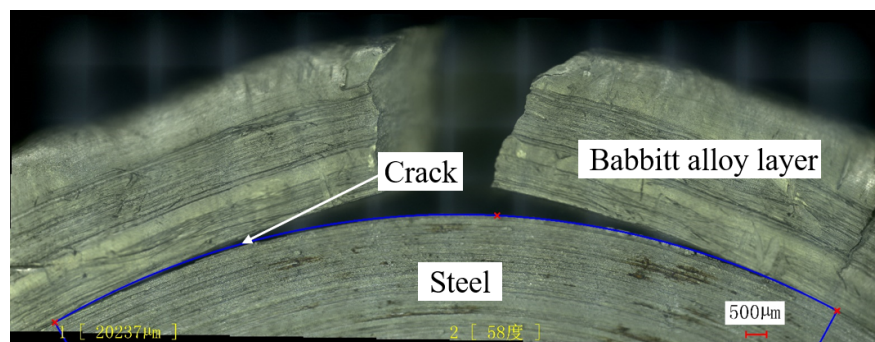
Hosted file

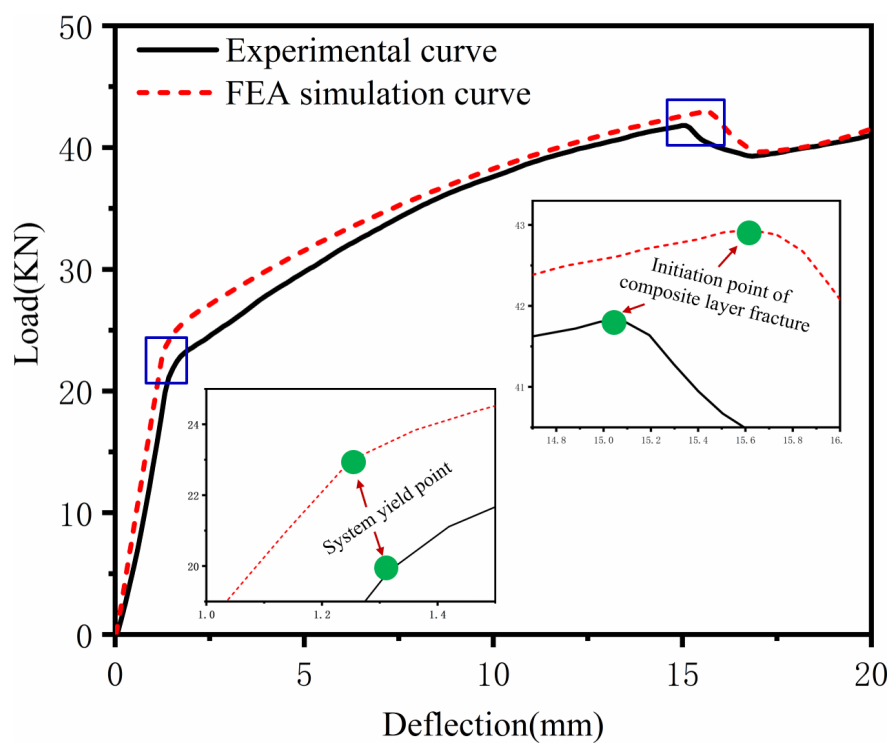
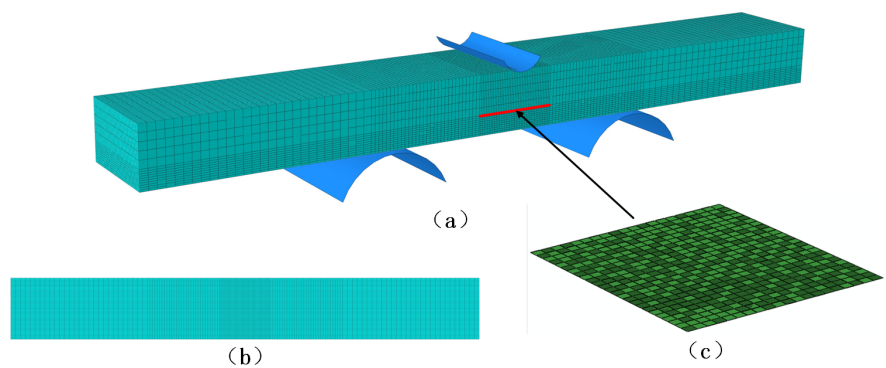
Manuscript file.pdf available at <https://authorea.com/users/373419/articles/491119-interfacial-fracture-toughness-measurement-of-new-composite-material-snsb11cu6-20steel>

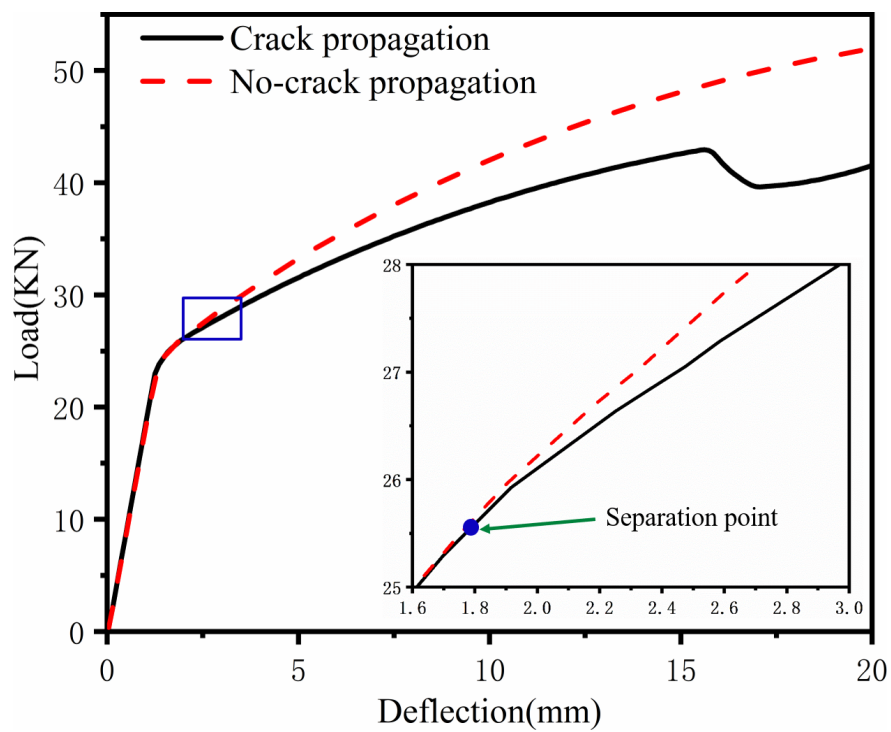


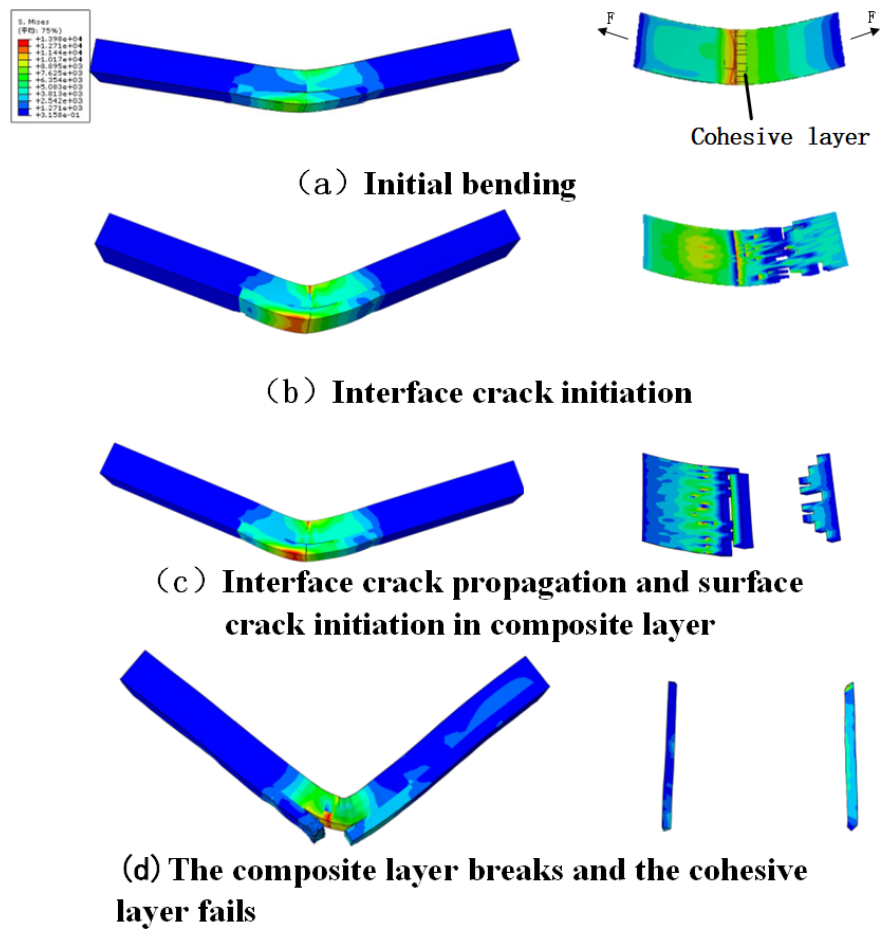
Hosted file

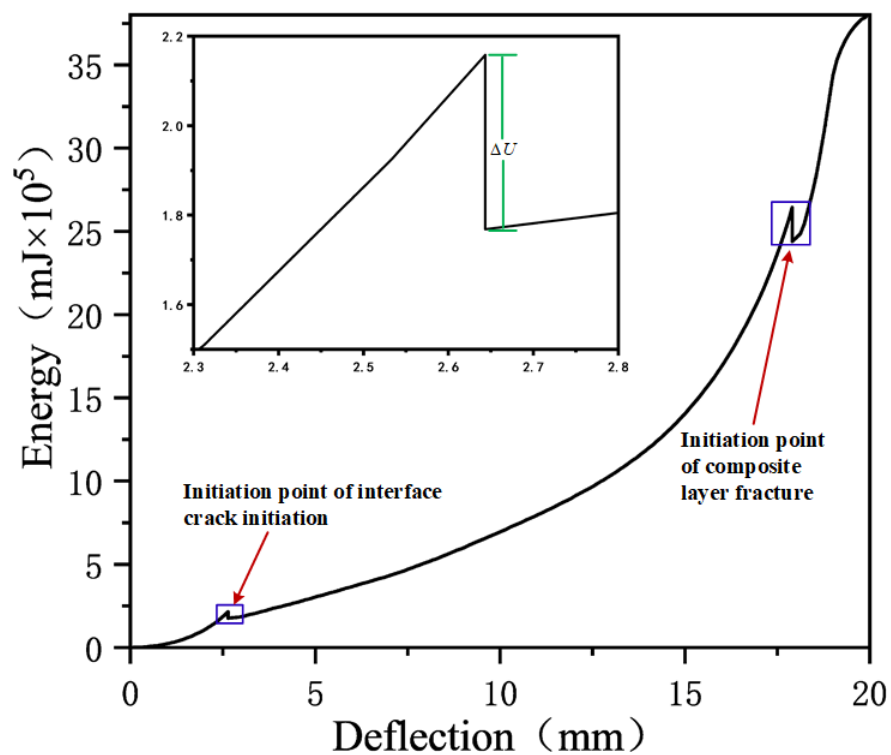
Table1.pdf available at <https://authorea.com/users/373419/articles/491119-interfacial-fracture-toughness-measurement-of-new-composite-material-snsb11cu6-20steel>











Hosted file

Table2.pdf available at <https://authorea.com/users/373419/articles/491119-interfacial-fracture-toughness-measurement-of-new-composite-material-snsb11cu6-20steel>

Hosted file

Table3.pdf available at <https://authorea.com/users/373419/articles/491119-interfacial-fracture-toughness-measurement-of-new-composite-material-snsb11cu6-20steel>