

Mode II Interlaminar Fracture Toughness of Stitched CFRP Composites under Impact Loading

H.P. Zhao^{1,2}, Robert K.Y. Li², Z.P. Duan¹, J.K Kim³ and Y.W. Mai⁴

¹ Division of Fundamental Mechanics, Institute of Mechanics, Chinese Academy of Sciences, 100080, Beijing, People's Republic of China

² Department of Applied Physics and Materials Science, City University of Hong Kong, Tat Chee Avenue, Kowloon, Hong Kong

³ Department of Mechanical Engineering, Hong Kong University of Science and Technology, Clear Water Bay, Kowloon, Hong Kong

⁴ Department of Manufacturing Engineering and Engineering Management, City University of Hong Kong, Tat Chee Avenue, Kowloon, Hong Kong.

Keywords: fracture toughness, stitching, SHPB, mode II, CFRP

The mode II Interlaminar fracture toughness of stitched CFRP composites under impact loading was investigated in this paper. CFRP composites laminates were lay up with 24 plies of prepreg, and were stitched with Kevlar yarns using three different stitching patterns (see Fig. 1). Other than the three different stitching patterns, two different stitching densities were also employed. The end-notch flexure (ENF) sample geometry was used. An experimental method using the modified Split Hopkinson Pressure Bar (SHPB) technique has been developed (Fig. 2) so as to evaluate the mode II interlaminar fracture toughness under impact rate of loading. Typical signals obtained from the SHPB measurements are shown in Fig. 3. Obviously, the experimental results showed that stitching technique could be designed to improve fracture resistance and impact resistance of CFRP in comparison to the non-stitched CFRP composite.

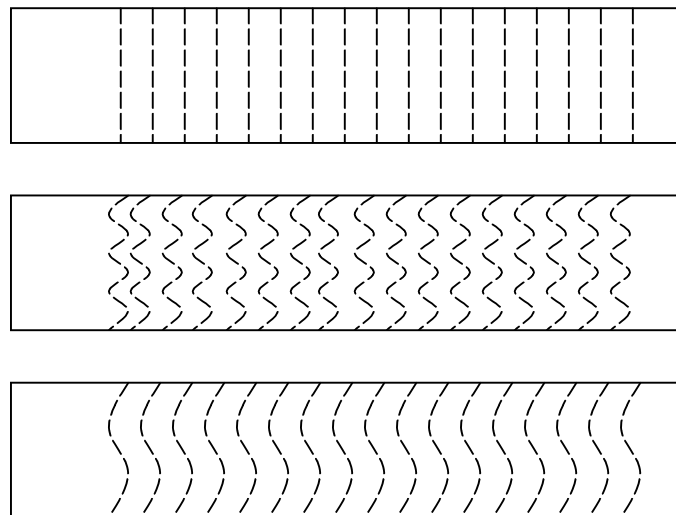


Fig.1 Diagram of three stitching patterns

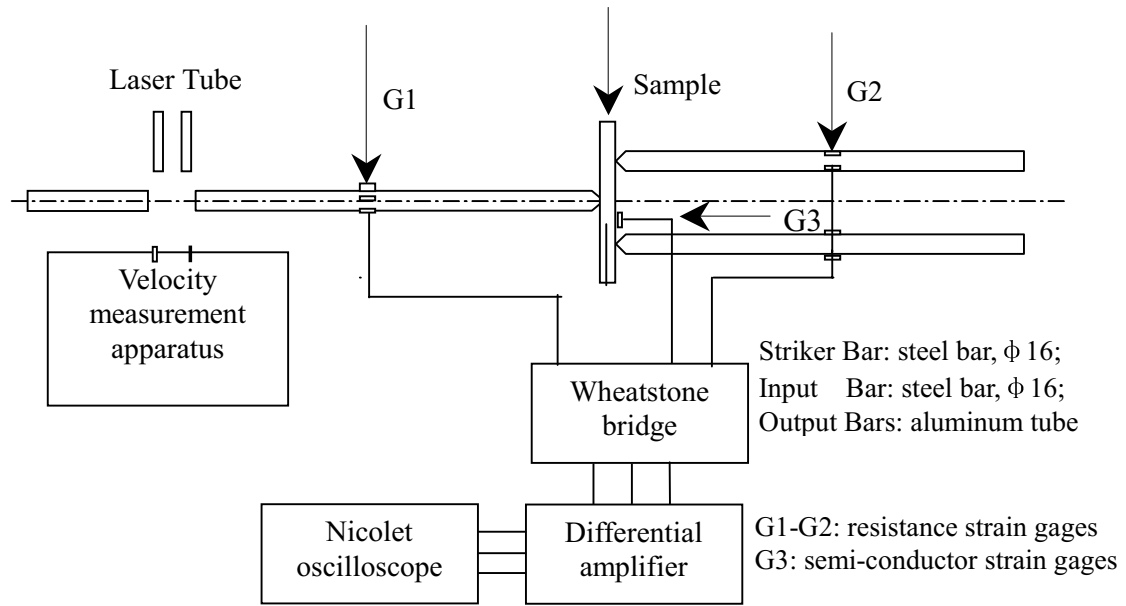


Fig.2 Configuration of ENF test using SHPB technique

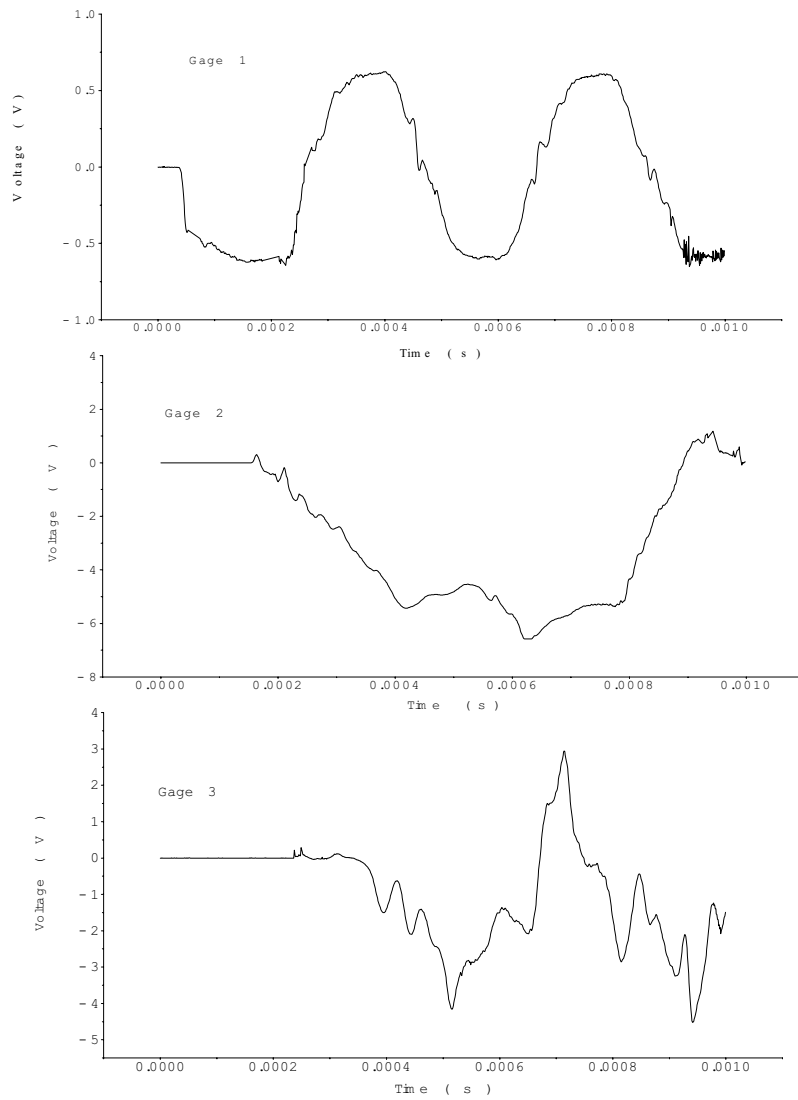


Fig.3 Typical signals obtained from the three strain gages