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H. Paul, N. Ledford, M. Sauer, M. May, M. Okamura



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Assessment of test methods for thick and thin layer adhesive joints under high rates of loadingH. Paul^{1*}, N. Ledford¹, M. Sauer¹, M. May¹, M. Okamura²¹Fraunhofer Institute for high-Speed Dynamics, Ernst-Mach-Institut, EMI, Eckerstr. 4, Freiburg, Germany²JSOL Corporation, 2-5-24, Harumi, Chuo ward, Tokyo, Japan

* Corresponding author, Tel: +49 (0)761 2714 – 507. Hanna.Paul@emi.fhg.de

Abstract

Testing procedures for two classes of adhesives with different characteristics for high rate testing using a Split Hopkinson Tension Bar are presented. The adhesive joints differ in their mechanical behavior, in the joint geometry, and in the interest of investigation. For thin layer adhesive joints, the adhesive thickness is usually below one millimeter. The strength is high and the strain to failure is comparatively small. In contrast, thick layer adhesive joints are characterized by adhesive thicknesses of several millimeters. The strength is comparatively small, however the strain to failure is quite large. For both classes of adhesives thick-walled butt joint specimens with different geometries were used for testing. The results show that for thin and thick layer adhesive joints Split Hopkinson Tension Bar experiments in the strain rate regime of 1000 s^{-1} can be performed successfully and results with high quality can be generated.

Keywords: impact, destructive testing, fracture, Split Hopkinson Tension Bar

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