Abstract Submitted
for the SHOCK19 Meeting of
The American Physical Society

A tensile split Hopkinson pressure bar for low impedance materials DAVID WILLIAMSON, University of Cambridge — A split Hopkinson pressure bar that is specifically designed for testing low impedance materials in uniaxial tension is discussed. The input and output bars are each 2.5 m long and formed of titanium alloy tubes and are of low mechanical impedance (Grade 9 alloy, 16 mm outside diameter, 1mm wall thickness). Tensile pulses are generated by the action of an impedance matched striker-tube which is coaxial to, and rides over the top of, the input-tube. The striker tube is propelled along the input-tube away from the specimen by a gas-gun with a wrap-around breech to strike a stop mounted at the end of the input-tube. The subsequent compressive pulse is inverted to become tensile by reflection from a free surface, and propagates back up the input-tube to interact with the specimen, causing it to be placed into a state of uniaxial tension with associated displacement rates of between 0.5 and 5 meters per second. In addition to force-displacement information obtained from strain gauges mounted on the bars, sample deformation is monitored using high-speed video and sample strains are extracted using digital image cross-correlation. Recent results from experiments on highly filled particulate composites with polymer matrices are presented.

David Williamson
University of Cambridge

Date submitted: 28 Feb 2019 Electronic form version 1.4