David A Jackson et al., J Material Sci Eng 2016, 5:3(Suppl)
http://dx.doi.org/10.4172/2169-0022.C1.037

Multichannel fibre laser Doppler vibrometer studies of hypervelocity impacts

David A Jackson[1], **Julio E Posada-Roman**[2] and **Jose A Garcia-Souto**[2]
[1]University of Kent, UK
[2]University Carlos III de Madrid, Spain

A multichannel fibre laser Doppler vibrometer was demonstrated with the capability of making simultaneous non contact impacts at 4 different locations. The optical source was a single frequency laser diode at 1500 nm, where the output power was coupled into a single mode fibre and transferred to a specially designed power distribution unit that contained 4 independent heterodyned interferometers with transceiver fibre links with autocollimators. The targets were either aluminium or carbon composites. Two sets of measurements were performed the first using small ball bearings (1-5.5 mm) falling under gravity, the second with small projectiles (micron to 1 mm) fired from an extremely high velocity light gas gun at speeds in the range 1-8 km/s, digital processing was used to recover and process the data. In addition the results of a previous experiment where fibre Bragg gratings strain sensors attached to the target are compared. Determination of impact damage is important for industries such as aerospace, military, auto, where the effect of an impact on the structure can result in a major structural damage. To our knowledge the research reported here demonstrates the first trials of a multichannel fibre laser Doppler vibrometer being used to detect hypervelocity impacts.

Biography

David A Jackson has a PhD in Nuclear Physics from the University of London. He is currently Emeritus Professor of Applied Optics University of Kent UK. He is responsible for many important innovations in the field of optical sensing including laser Doppler velocimetry, non-contact vibration and displacement measurements and fibre optic sensors. His interests in fibre optic sensors include intrinsic and extrinsic single mode optic sensors based upon optical interferometers and fibre Bragg gratings. He has researched optics for medical applications such as OCT, miniature temperature and pressure probes He has authored or co-authored over 300 journal and 300 conference papers.

D.A.Jackson@kent.ac.uk

Notes: