

Photon Doppler velocimetry signals processing at low velocity impact

Yurina A D[®], Uvarov S V and Naimark O B

Institute of Continuous Media Mechanics of the Ural Branch of the Russian Academy of Sciences, Academician Korolev Street 1, Perm 614013, Russia

[®] sandrayur@icloud.com

The purpose is to study material properties of silicified graphite and titanium alloy VT-6 at low-speed impact using digital processing of photon Doppler velocimetry (PDV) [1] signals. The load of targets was realized by ballistic set-up [2] and rod projectile accelerated up to 100 m/s. Velocity profile was reconstructed from PDV signals using the wavelet transform to select low frequency modes for following verification of fracture models for materials with pronounced ductile (titanium alloys) and brittle (ceramics) responses. Studied impact velocity range allows investigation of material responses (relaxation properties, damage–failure transition) at intermediate load intensity between Johnson–Cook and plate impact tests conditions. Application of different types of wavelet transforms is analyzed. This research was supported by the Russian Science Foundation (project No. 21-79-30041).

[1] Dolan D H 2020 *Rev. Sci. Instrum.* **91** 051501

[2] Etemadi E, Zamani J, and Jafarzadeh M 2018 *Proc. Inst. Mech. Eng., Part L* **232** 106–120