

Tomography of silicified graphite samples under ballistic and dynamic loading

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The study aims to investigate the properties of silicified graphite under ballistic and dynamic loading. Data were obtained using photonic Doppler velocimetry (PDV) with advanced digital signal processing techniques [1]. Ballistic loading was performed using a ballistic setup [2]. The second type of dynamic testing is dynamic indentAtion on a Hopkinson of Kolsky. The velocity profile during ballistic loading was reconstructed from PDV signals using wavelet and chirplet transformations to isolate low-frequency modes. These modes were further used to validate material failure models, particularly for brittle materials such as ceramics. Post-test X-ray computed tomography (CT) of silicified graphite samples revealed damage patterns after ballistic and dynamic loading. Ballistic loading caused localized damage, including radial cracking and spallation, while dynamic loading led to distributed microcracking and delamination. These findings provide valuable insights into failure mechanisms and help improve material models for predicting performance under extreme conditions.

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[1] Dolan D 2020 *Review of Scientific Instruments* **91**

[2] Etemadi E, Zamani J, and Jafarzadeh M 2018 *Proceedings of the Institution of Mechanical Engineers, Part L: Journal of Materials: Design and Applications* **232** 106–120