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High-Speed Infrared investigations of local heating in a Graphite-Fiber-PDMS Composite material Under dynamic loading. STEPHANE BOUBANGA TOMBET, Telops, 100-2600 Saint-Jean Baptiste Ave, Qubec (QC), Canada, SURAJ RAVINDRAN, ADDIS KIDANE, Mechanical Engineering, University of South Carolina - 300 Main Street A132, Columbia, SC 29208, FRDRICK MARCOTTE, Telops, 100-2600 Saint-Jean Baptiste Ave, Qubec (QC), Canada — Infrared thermal imaging also often called thermography is a very evolving field in science as well as industry owning to the enormous progress made in the last 3 decades in microsystem technologies of IR detector design, electronics, and computer science. The development of high-speed IR cameras with high temporal resolution has given rise to a wide variety of demanding thermal imaging applications ranging from academics and research, industrial R&D, non-destructive testing and materials testing, aerospace and defense. We have recently demonstrated the potentialities of high-speed and high-definition IR imaging in experimental mechanics by monitoring heat releases during tensile and shear tests. In the present work we have investigated heat generation dynamics in a graphite cylindrical rods embedded in a polydimethylsiloxane composite material. We were able to observe the effect of both tensile and shear stress on the fibers. The breaking was found mostly to be due to shear stress. Some tensile-stress-induced hot spots were measured with temperature nearly 22 times higher. We also observed a clear influence of the fiber alignment and density in the epoxy matrix on heat generation and the breaking dynamics of the fibers.

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