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Determination of the optical behaviour of an explosive charge during detonation in an open air environment

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Current military operations occur in built up areas and contains high level of uncertainties due to the uses of improvised explosive devices (IEDs). Because of the current operational theatre and the uncertainties of IEDs, military vehicles have to achieve high level of mobility without compromising the required protections against these threats. One approach to deal with the conflicting requirements between adequate protection and high mobility is to employ detection systems which can aid with avoidance protection or interception of threats. To optimise the effectiveness of the detection system employed for the interception concepts such as active blast protection system, knowledge about the emissions from the explosion processes following detonation is required so that adequate mitigation system can be employed.

The undertaken study focuses on using the light emissions emanating from an explosion of high explosives to understand the origin of the detected optical signature. Preliminary analysis of optical data obtained during previous explosives tests at the CSIR's explosives test range is presented. Optical detector- filter combination of wavelengths ranging from $0.254\ \mu\text{m}$ to $12.2\ \mu\text{m}$ was used to select study light emissions of wavelengths of interest. From the analysis, distinct optical maxima are observed which varies from Ultraviolet (UV) to the Infrared (IR). The UV optical profile contains sharp optical peaks which last for less than a few microseconds while the IR show a slow rising light signal in the millisecond region. The next task is to use light signature to understand and be able to explain what may have caused the signals captured at certain region of the spectrum, the origin of the relationship between amplitude maxima and wavelength.

Apply to be considered for a student award (Yes / No)?

Yes

Level for award (Hons, MSc, PhD, N/A)?

MSc

Main supervisor (name and email) and his / her institution

Professor Chris Theron, chris.theron@up.ac.za, University of Pretoria

Would you like to submit a short paper for the Conference Proceedings (Yes / No)?

Yes

Primary author: Ms THUNYISWA, Nomahlubi (CSIR)

Co-authors: Prof. THERON, Chris (University of Pretoria); Mr OLIVIER, Marius (CSIR); Dr SONO, Tleyane (CSIR)

Presenter: Ms THUNYISWA, Nomahlubi (CSIR)

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