

PhD proposal 2023-2026

Advanced concepts of ballistic protection by experiment/simulation correlation and optimization

Context

The continuous evolution of threats in the land, naval, aeronautical and space domains requires adaptation of the means of protection through the study of new concepts of protection. These new concepts often involve the use of functional materials of very different natures, metallic, ceramic, polymeric, composite or hybrid. This project is part of the optimization of the performance of technological solutions of passive ballistic protection.

Objectives :

This project aims first of all to develop a robust methodology for the design of passive protection systems based on a functional approach. This methodology will be based on an experiment-numerical simulation correlation and the coupling between a code of finite element calculations and an optimization module in an advanced design approach.

Previous work (PhD Thesis of Yohan Cosquer, 2021) has shown the promise of a methodology based on a correlation between experiments and simulations following three stages: (i) calibration and verification of a numerical model, (ii) validation of the numerical model and (iii) use of the numerical model in an optimization process.

By acquiring learning experience on existing concepts and materials for which results are available, the objective of the proposed thesis is to develop technological solutions based on virtual structural materials guaranteeing the desired functions and obtained by optimization of dimensions and properties.

The most promising concepts will be implemented (assembly, additive manufacturing) and their performance will be

evaluated by laboratory or/and tunnel tests.

The applications are mainly for the protection of land and aerospace vehicles.

Keywords :

Terminal ballistics, numerical simulation, functional materials, optimization

Conditions and skills :

- * EU, UK or Swiss national
- * Master or equivalent
- * Computational and/or non-linear materials mechanics skills
- * Taste for programming (fortran, python)

Supervisors :

Advisor : Patrice Longère
ISAE-SUPAERO / ICA (UMR CNRS 5312)
Co-advisor : Jean-Philippe Crété
ISAE-SUPMECA/QUARTZ (EA 7393)

Location :

Institut Clément Ader CNRS 5312, Toulouse.

Average salary (over the 3 years) :

Around 2000 euros net per month

Beginning :

As soon as possible

Contacts

CV and cover letter to be sent to
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