PhD THESIS ABSTRACT
"CONTRIBUTIONS REGARDING THE STUDY OF SHOCK WAVE INTERACTION GENERATED BY EXPLOSIONS WITH PERFORATED PLATE STRUCTURES"

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The topic addressed within the scientific research thesis "Contributions regarding the study of shock wave interaction generated by explosions with perforated plate structures" falls within the field of mechanical engineering and constitutes a subject of great interest and relevance at the international level. This is due to the ongoing transformation and refinement of both tactical threats and self-propelled armored vehicles, which are directly threatened by them.

The main objective of the thesis is the experimental and numerical study of the interaction of shock waves generated by the detonation of explosive materials with perforated plate structures, intended for the ballistic protection of self-propelled vehicles. Reaching the main goal involved a gradual approach, which aimed to:

- identifying the threats in the tactical field to which the special self-propelled structures are exposed,
- identifying testing procedures to determine the level of protection of self-propelled combat vehicles against various threats,
- identifying methods for generating shockwaves and current means of attenuating them,
- identifying and detailing existing theoretical models that address the propagation of shockwaves and their interaction with perforated plate structures,
- defining a principle configuration of perforated plates suitable for placement on existing self-propelled combat vehicles in order to increase ballistic protection against shockwaves,
- conducting experimental research on the interaction of high-intensity shockwaves with perforated plate structures,
- numerically investigating the interaction between shockwaves and perforated plate structures using three commercial simulation software.

The thesis is structured into six chapters and includes a bibliography with 140 relevant titles on the subject.

For the three commercial numerical analysis programs used (Impetus Afea®, ANSYS LsDyna®, and ANSYS AUTODYN®), the precision of the calculations was correlated with the time required to perform the numerical simulation, highlighting that an acceptable accuracy of results (within 5% of experimental values) was achieved when using the ANSYS LsDyna® and ANSYS AUTODYN® programs. Although the precision of results is lower with the Impetus Afea® program, the time required to conduct the numerical analysis is significantly shorter for this program. This makes it the preferred tool for performing detailed analysis of the studied phenomenon in the case of a pre-design calculation with a more qualitative analysis approach.