Ph THESIS ABSTRATCT

"Contributions regarding the development and evaluation of the performance of self-protection systems with thermal decoy pyrotechnic ammunition"

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The subject addressed in the doctoral thesis "*Contributions regarding the development and evaluation of the performance of self-protection systems with thermal decoy pyrotechnic ammunition*" belongs to the scientific field of *mechanical engineering*, representing a topic of strategic importance at the present time, in the geo-political context in which we find ourselves.

The main objective of the thesis is the development of a FLARE-type pyrotechnic ammunition that includes an innovative pyrotechnic charge, based on a new chemical composition. The characteristics of the composition are reflected in the functional performance of the ammunition, following its combustion forming reaction products that emit IR radiation with selective wavelengths. To achieve this objective, the following reaseach activities were performed, as follows:

- Carrying out a study of the current state of existing solutions and the level of development of the aircraft self-protection systems;
- Mathematical modeling of the combustion phenomenon that occurs in the case of pyrotechnic compositions and numerical simulation in order to obtain the thermodynamic parameters in order to select the composition with optimal performance;
- Validation of the analytical models developed through experimental determinations the performance characteristics (heat of combustion, specific volume and temperature of combustion) of the numerically simulated compositions;
- Development of a new, innovative method for preparation of the developed composition and casting it into pellets.
- Characterization of the formulated pyrotechnic compositions in terms of thermal stability and safety in the preparation and loading process, as well as their physico-chemical and mechanical properties;
- Integration of the new pyrotechnic composition in standardized NATO ammunition;
- Characterization of the new FLARE ammunition by filed testing using standardised dispensers and electrical interface.

The results obtained from the studies and experimental research carried out can be of real use to specialists working in the field of energetic materials, including improved performance pyrotechnic compositions for thermal decoy ammunition.