

**Doctoral School of Information and Biomedical Technologies
Polish Academy of Sciences (TIB PAN)**

SUBJECT:

Dynamic analysis of brittle materials considering the interphase zones
Field: Technical Informatics and Telecommunications
Computational Mechanics, Numerical Methods

SUPERVISOR:

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DESCRIPTION:

Multiphase composites, and especially ceramics, are used in virtually all industries that are crucial for the functioning of the world economy.

The aim of the study is to determine how the brittle materials are fragmenting under impact loads, sudden pressure and temperature increase, taking into account the transition zones (interfaces) between the various phases of the composite.

Mainly numerical methods such as the finite element method, meshless methods (e.g. peridynamics, sph) and molecular dynamics methods will be used. Mainly high performance computers (HPC) will be used in the calculations. The reason for this approach is the desire to initially define the phenomena that may occur, and whose experimental analysis is still impossible. In this way, hypotheses are created that enable the design of experimental research.

BIBLIOGRAPHY:

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2. Voyiadjis, G.Z., Handbook of Damage Mechanics, Springer, 2015.
3. Postek E., Sadowski T., Thermomechanical effects during impact testing of WC/Co composite material, Composite Structures, DOI: 10.1016/j.compstruct.2020.112054, Vol.241, pp.1-25, 2020. <http://www.ippt.pan.pl/Repository/protected/p6784.pdf>
4. Postek E., Pęcherski R., Nowak Z., Peridynamic simulation of crushing processes in copper open-cell foam, Archives of Metallurgy and Materials, Vol. 64, No. 4, pp. 1603-1610, 2019. DOI: 10.24425/amm.2019.130133 <https://www.ippt.pan.pl/Repository/o6598.pdf>