

## ABSTRACT

The PhD. thesis entitled "Methods and techniques for bio-system's materials behaviour analysis", aims, from the start, a systematic study of the biomaterials categories and their mechanical, chemical, thermal, etc. characteristics. The study is completed with methods and means for analysing the behaviour of biocomposites materials. Based on this study, the research work focuses on the analysis of the mechanical and thermal behaviour of layered composites consisting of epoxy prepreg blades reinforced with unidirectional and in diagonal carbon fibre fabrics. These layered categories are used in the construction of prosthetic blades in the form of "J" in order to support dentures worn by runners in the stages of competition and training. In order to identify the characteristics of these layered categories, in the paper were developed two lines of research: developing a method for analyzing the anatomy of the lower limb regarding: the skeletal system, the joint system, gait and running biomechanics on non-amputees, gait and sprint biomechanics on amputees with sports prostheses which contain the prosthetic blades "J"; developing theoretical methods to analyse the layered composite made of epoxy blades reinforced with unidirectional and in diagonal carbon fibres. The research concludes with the development of experimental procedures for determining the mechanical and thermal characteristics of layered composite made of epoxy blades reinforced with unidirectional and in diagonal carbon fibres. The experimental research procedures include compression and bending tests, the analysing method Dynamical Mechanical Analyser DMA and thermal determination tests. The test specimens consist of layered composites with 3, 5 and 7 blades having unidirectional and in diagonal carbon fabrics. The experimental results allow the determination of the real values of lamina, and respectively composite elasticity law and also of the analysis regarding the composite real thermal behaviour. The thesis combines knowledge from different areas: anatomy, biomechanics, biomaterials, layered composite materials, physics, etc. The research paper is of an actual interest with high potential in sports and in improving the comfort and the psychic of the persons that suffered transtibial amputation.