# FEM MODEL OF PELVIC BONES FOR BIOMECHANICAL ANALYSIS


## Summary

The aim of this study was to develop a computational model of the pelvic bone using the Finite Element Method (FEM). Contemporary numerical models often rely on simplified assumptions that do not fully capture the complexity of this area. In the context of these challenges, there is a need for more accurate and personalized FEM models. The developed model can serve as a tool to assist medical professionals, enabling more efficient planning of surgical procedures and the treatment and rehabilitation processes of patients. As a result, achieving the set research goal can significantly improve the quality of life for patients, as therapies and treatment plans can be tailored to their individual needs.

An integrated biomechanical approach was applied in the development of the model. It is based on the utilization of data collected through advanced measurement techniques, including both medical and engineering methods. This approach allowed for the personalization of the model, with elements such as the geometric model and load conditions being subjected to customization.

The second research objective was to enhance effective methods for visualizing the results of numerical analyses. Presenting results in the form of 2D images or digital 3D models does not always convey the complete diagnostic information. Physical 3D models offer a more efficient means of conveying information.

As a result of the conducted research, a computational model of anatomical structures was developed, along with the methodology for its development and visualization of FEM analysis results. The verification of results obtained from numerical analyses confirmed the correctness of the model development process. The application of an integrated biomechanical approach in model development allowed for personalization and the attainment of results that better reflect reality. The described methodology for model development can also be applied to create models of other anatomical structures.



**Keywords:** pelvic biomechanics, physiological loadings, finite element method