

## **Mechanical Cortical Bone Characterization with the Finite Element Method Based Inverse Method**

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**Abstract :** Cortical bone is a complex multi-scale structure. Even though several works have contributed significantly to understanding its mechanical behavior, this behavior remains poorly understood. Nanoindentation testing is one of the primary testing techniques for the mechanical characterization of bone at small scales. The purpose of this study was to provide new nanoindentation data of cortical bovine bone in different directions and at different bone microstructures (osteonal, interstitial and lamellar bone), and then to identify anisotropic properties of samples with FEM (finite element method) based inverse method. Experimentally and numerical results were compared. Experimental and numerical results were compared. The results compared were in good agreement.

**Keywords :** mechanical behavior of bone, nanoindentation, finite element analysis, inverse optimization approach

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