

Study on Stability and Wear in a Total Hip Prostheses

Authors : Virgil Florescu, Lucian Capitanu

Abstract : The studies performed by the author and presented here focus mainly on the FE simulation of some relevant phenomena related to stability of orthopedic implants, especially those components of Total Hip Prostheses. The objectives are to study the mechanisms of achieving stability of acetabular prosthetic components and the influence of some characteristic parameters, to evaluate the effect of femoral stem fixation modality on the stability of prosthetic component and to predict long-term behavior, to analyze a critical phenomena which influence the loading transfer mechanism through artificial joints and could lead to aseptic loosening - the wear of joint frictional surfaces. After a theoretical background an application is made considering only three activities: normal walking, stair ascending and stair descending. For each activity, this function is maximized in a different locations: if for normal walking the maxima is in the superior-posterior part of the acetabular cup, for stair descending this maxim value could be located rather in the superior-anterior part, for stair ascending being even closer to the central area of the cup.

Keywords : THA, acetabular stability, FEM simulation, stresses and displacements, wear tests, wear simulation

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