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# Virtual Test Model for Qualification of Knee Prosthesis

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**Abstract :** Purpose: In the human knee joint, degenerative joint disease may happen with time. The standard treatment of this disease is the total knee replacement through prosthesis implanting. The reason lies in the fact that this phenomenon causes different material abrasion as compare to pure sliding or rolling alone. This study focuses on developing a knee prosthesis geometry, which fulfills the mechanical and kinematical requirements. Method: The MSC ADAMS program is used to describe the rotation of the human knee joint as a function of flexion, and to investigate how the flexion and rotation movement changes between the condyles of a multi-body model of the knee prosthesis as a function of flexion angle (in the functional arc of the knee (20-120º)). Moreover, the multi-body model with identical boundary conditions is constituted, and the numerical simulations are carried out using the MSC ADAMS program system. Results: It is concluded that the use of the multi-body model reduces time and cost since it does not need to manufacture the tibia and the femur as it requires for the knee prosthesis of the test machine. Moreover, without measuring or by dispensing with a test machine for the knee prosthesis geometry, approximation of the results of our model to a human knee is carried out directly. Conclusion: The pattern obtained by the multi-body model provides an insight for future experimental tests related to the rotation and flexion of the knee joint concerning the actual average and friction load.

**Keywords :** biomechanics, knee joint, rotation, flexion, kinematics, MSC ADAMS
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