

Study of The Reliability of A Composite Used In The Knee Prosthesis

L. Alimi, M. Boulkra, N. Sassane, S. Boukhezar, M. HASSANI, K. Bedoud, K. BEY

Abstract: In orthopedic surgery, the effectiveness of the implants used, such as hip and knee prostheses, depends mainly on their geometries and the type of loading to which they are subjected. In this work a probabilistic approach is chosen to study the reliability of a composite structure used in the manufacture of knee prostheses. The purpose of integrating reliability concepts is to consider uncertainty in several aspects including loading and material properties. The reliability index β is an excellent indication of durability and safety for given operating conditions. β is obtained using failure probability and a mechanical model. The critical stress intensity factor (K_{Ic}) is adopted as a criterion to the maximum limit of a numerically calculated KI. The results presented are discussed according to the length of the crack (a), and the limit load used.

Keywords : Reliability analysis, critical stress intensity factor, crack length, load, reliability index