

## Analysis of Artificial Hip Joint Using Finite Element Method

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**Abstract :** Hip joint plays very important role in human beings as it takes up the whole body forces generated due to various activities. These loads are repetitive and fluctuating depending on the activities such as standing, sitting, jogging, stair casing, climbing, etc. which may lead to failure of Hip joint. Hip joint modification and replacement are common in old aged persons as well as younger persons. In this research study static and Fatigue analysis of Hip joint model was carried out using finite element software ANSYS. Stress distribution obtained from result of static analysis, material properties and S-N curve data of fabricated Ultra High molecular weight polyethylene / 50 wt% short E glass fibres + 40 wt% TiO<sub>2</sub> Polymer matrix composites specimens were used to estimate fatigue life of Hip joint using stiffness Degradation model for polymer matrix composites. The stress distribution obtained from static analysis was found to be within the acceptable range. The factor of safety calculated from linear Palmgren linear damage rule is less than one, which indicates the component is safe under the design.

**Keywords :** hip joint, polymer matrix composite, static analysis, fatigue analysis, stress life approach

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