Review Article:

**Advanced Computational Methods in Bio-Mechanics**

Waleed M.S. Al Qahtani**1**, Mohamed I. El-Anwar**2**

# 1 Prosthodontics and Implantology Division, AL-Farabi Dental College, Jeddah, Saudi Arabia

# 2[[1]](#footnote-1)\* Mechanical Engineering Dept., National Research Centre, Egypt

# Abstract

A novel partnership between surgeons and machines, made possible by advances in computing and engineering technology, could overcome many of the limitations of traditional surgery. By extending surgeons’ ability to plan and carry out surgical interventions more accurately and with less trauma, computer-integrated surgery (CIS) systems could help to improve clinical outcomes and the efficiency of healthcare delivery. CIS systems could have a similar impact on surgery to that long since realized in computer-integrated manufacturing. Mathematical modeling and computer simulation have proved tremendously successful in engineering.

Computational mechanics has enabled technological developments in virtually every area of our lives. One of the greatest challenges for mechanists is to extend the success of computational mechanics to fields outside traditional engineering, in particular to biology, the biomedical sciences, and medicine. Biomechanics clearly has significant potential for applications in orthopedic industry and in the performance arts, since skills needed for these activities are visibly related to the human musculoskeletal and nervous systems.

Although, biomechanics is widely used nowadays in orthopedic industry to design orthopedic implants for human joints, dental parts, external fixations and other medical purposes, a numerous researches funded by billions of dollars are still running to build a new future for sports and human healthcare in what is called biomechanics era.

**Keywords:** Biomechanics, Finite Difference Method, Finite Element Method, Finite Volume Method, Applications, Computational Techniques, Computational Methods.

1. \* Corresponding author: Mohamed I. El-Anwar

National Research Centre, Egypt

33 El Bohouth St., Dokki, Giza, P.O. 12622, Egypt.

Phone: +2 0122 2431297

Fax: +2 02 33370931

Email: anwar\_eg@yahoo.com [↑](#footnote-ref-1)