

## **Intra-operative CT-Free examination system for anterior cruciate ligament reconstruction**

### **Abstract**

Computer assisted navigation and biomechanical modeling have made surgical simulation a new domain of research in the last decade. In this paper, we focus on assisting the surgeon to manage anterior cruciate ligament (ACL) reconstruction. During this operation, the ACL graft has to be placed in such a way that it is isometric during a flexion-extension and in traction when the leg is in extension. That is to say, two constraints: a geometrical one and a physical one. We present a CT-Free system that solves both these constraints in real-time and intra-operatively. The geometrical constraint is solved by Aesculap's OrthoPilot system while a deformable model is used to solve the physical one. With our combined solution, the surgeon will be able to know intra-operatively if the graft placement will lead to robust and effective reconstruction or otherwise.

**Keywords** — CT-Free system, ligaments, Anterior cruciate ligament (ACL), real time systems, biomechanics, computer simulation