ORTHOTROPIC MATERIAL OF BONES GENERATED BY MEANS OF CLINICAL CT-DATA, APPLIED TO FE-MODELS FOR THE NONLINEAR SIMULATION OF ONE-LEG STAND WITH PELVIS, FEMUR AND LOWER LEG

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KEYWORDS -

ABSTRACT - A realistically modelling of the material of bones on the basis of clinical CT-Data is presented well suited for nonlinear analyses. The determination of the needed independent variables for the orthotropic stiffness was performed using established procedures. The identification of the different directions of orthotropy was carried out with the so called Star-length-distribution.

Using these directions the Youngs-moduli are evaluated by following the method invented by Roh-Hobatho-Ashman interpreting the density distribution of the CT-Data. The determination of the Poissons ratios was ascertained by empirical knowledge and then used for the definition of shear-moduli. The mapping of these sets of data to the realistic FE-model of one-leg-stand is presented, which is built of pelvis, femur and lower leg together with their appropriate muscles and tendons.

The sane skeleton as well as a stabilised trochantric fracture is shown in a one-leg-stand situation, analysed with a nonlinear standard solver to visualize the functionality of the implant with respect to the different distribution of forces.