Abstract:
The development times of car seats decrease while the demand for more comfortable seats increases at the same time. To fulfill this trade-off, numerical simulation of the body/seat interaction could be used. Therefore numerical models of the sitting human are needed. For this reason a 3D-FE-model of the thigh and pelvis of a 50th percentile male has been developed. The surfaces of the thigh and of the bones were gathered by a laser scanner. For the undeformed outer shape a test subject was chosen who has the anthropometry of a 50th percentile male. The geometry of the bones was scanned from a skeleton of a 50th percentile male. From the scanned data 3D CAD surfaces were derived. Within the CAD-system the bony structures were positioned inside the outer shape of the thigh and pelvis using computer tomography images. The biomechanic properties of the soft tissue were determined through indentation tests on test subjects. The results of these tests are force-deflection curves of thigh and pelvis. The 3D CAD model was meshed and imported into FE-computing software for simulation. Material properties were gained by simulation of the experiments. To validate the model the test subject sat on a plain wooden plate. During the experiment the pressure distribution between test subject and seat was gathered by a pressure mat. After that the experiments were rebuild within the FE-model and the pressure distribution from the experiment was compared with the results of the simulation.