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Poster Session - Abstracts

Development of a large-scale golfer computer model to study swing kinematics

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Despite an increase in the number of full-body three-dimensional computer models of the golf swing reported in the literature, many authors do not report in detail how the models are validated. Therefore, the aim of this study was to create and validate a three-dimensional full-body computer model of a golfer with a driver in terms of its kinematic output. Single-subject analysis was used whereby one elite female golfer (handicap 0) performed 16 shots with her own driver club. A 6-camera Motion Analysis infrared camera system operating at 400 Hz recorded the kinematic data of the 27 markers located on the subject and golf club. Subsequently, this data was used to drive a computer model created in ADAMS/LifeMOD software. Model construction methods closely follow that of Nesbit (2005). Additional markers were placed on the subject and were used for model validation as opposed to driving the model. In order to initiate the movement of the model, inverse and forward dynamics calculations were carried out with the imported motion data captured from one representative trial captured during experimentation. The results illustrate a high level of correlation (average r=0.949) between the kinematic data collected in experimentation and the predicted trajectory of the virtual markers of the model. Furthermore, a comparison of the difference between the simulated and actual displacements of these markers between certain key events of the golf swing indicated there were on average small differences (0.06 m between address and top of backswing and 0.06 m between top of backswing and impact) between the model simulation and the displacement recorded during experimentation. An analysis of the temporal differences of key events (i.e. swing tempo) indicated that there was little difference (0.59% difference in both backswing and downswing time between model and actual trial) in this variable between the model and the experimental trial used to drive the model. Collectively, these results indicate that this model can accurately predict the kinematic movement pattern of the subject used to drive the model. Future work will encompass kinetic validation. At present, a full-body computer model was created and validated in terms of its kinematic output; future work will utilize data derived from this model to further investigate the golf swing.

Keywords: computer simulation; golf swing; kinematics; validation