

# Author's Accepted Manuscript

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PII: S0021-9290(16)30782-5  
DOI: <http://dx.doi.org/10.1016/j.jbiomech.2016.07.018>  
Reference: BM7808

To appear in: *Journal of Biomechanics*

Received date: 5 August 2015  
Revised date: 20 July 2016  
Accepted date: 20 July 2016

Cite this article as: Agneta Gustus and Patrick van der Smagt, Evaluation of Joint Type Modelling in the Human Hand, *Journal of Biomechanics* <http://dx.doi.org/10.1016/j.jbiomech.2016.07.018>

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# Evaluation of Joint Type Modelling in the Human Hand

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## Abstract

This short communication presents preliminary results from an extensive investigation of joint modelling for the human hand. We use finger and hand movement data recorded from both hands of 110 subjects using passive reflective markers on the skin. Furthermore, we use data which was recorded from a single Thiel-fixated cadaver hand using also passive reflective markers but fixed to the bone. Our data clearly demonstrate that, for wrist and finger joints, hinge joint models are sufficiently accurate to describe their movement in Cartesian space.

*Keywords:* human hand model, joint model, wrist, metacarpophalangeal joint (MCP), proximal interphalangeal joint (PIP), distal interphalangeal joint (DIP)

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## 1. Introduction

2 For understanding human hand functionality proper joint modelling is cru-  
3 cial. The range of available simulations spread from hinge joints [16, 1, 8, 15]  
4 over double hinge joints (called ovoid motion in [14], obtained by geometric  
5 measurements) to costly multibody simulations [6, 5] and combined multibody  
6 finite-element simulations [11].

7 We present an objective measure for deciding which joint model type should  
8 be used for a simulation by providing a numerical measurement on goodness of  
9 fit. For this purpose we use the sample deviation between the recorded marker

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