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ET EN IMAGERIE MÉDICALE »

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**NICDS WORKSHOP “THE ANALYSIS OF DIRECTIONAL DATA WITH APPLICATIONS TO
BIOMECHANICS AND BIOMEDICAL IMAGING”**

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Using Geometry to Reveal Small Differences
in the Kinematics of the Knee During Gait

MICHAEL PIERRYNOWSKI

School of Rehabilitation Science
McMaster University
1280 Main Street West
Hamilton, ON L8S 4L8
CANADA

pierryn@mcmaster.ca

One goal of gait analysis is to accurately measure and display joint angular motion. These joint motion data have been traditionally displayed using a triplet of time-series angles which are then viewed to extract features that are of clinical interest. However, the ability of this method to detect small inter-subject differences is poor. The poor performance is commonly attributed to angle cross-talk, the influence of soft-tissue artifact, and deciding which time-dependent feature to emphasize. In this presentation, alternative methods are discussed which each reveal subtle differences in the knee kinematics of three asymptomatic volunteers which were poorly detected when viewed using standard data presentation. These methods use spherical projection, differential geometry, spectral decomposition and diffusion. Since the methods were successful when examining “gold-standard” bone pin data (see A Cappozzo’s presentation) they offer new approaches to attenuate the effects of marker system misalignment and soft-tissue artifact.

This is joint work with Stephan Huckemann from the University of Göttingen.