VALIDATION OF A THEORETICAL ROWING MODEL USING EXPERIMENTAL DATA

[1,3] Alan Lai, [2,3]Daniel A. James, [1,3]Jason P. Hayes, [4]Anthony Rice and [1,3]Erol C. Harvey
[1]Industrial Research Institute Swinburne, Swinburne University of Technology, Australia,
[2]School of Microelectronic Engineering, Griffith University, Australia,
[3]Cooperative Research Centre for microTechnology, Australia,
[4]Australian Institute of Sport; email: alai@swin.edu.au

INTRODUCTION

The identification of key parameters in acceleration profiles as a means to evaluate rowing performance has traditionally been difficult to achieve. A review of the literature shows that no publication to date has attempted this, possibly due to the mechanical complexity of rowing. In this paper a single-scull rowing model, created using MathWorks' Matlab® and Simulink®, is presented. The model has been created to investigate the feasibility of monitoring shell acceleration as a means to assess single rower technique.

METHODS

The developed model describes the rower as linkages (Figure 1) rather than a series of lumped masses; a distinction from many of the existing rowing models [1-3]. The motivation for modelling the rower in such great detail is to generate a more realistic shell acceleration trace. Each body segment of the rower model was based on cadaver limb dimension data [4]. Input parameters and boundary conditions for the rower motion were based on 3D acceleration and video data collected from a single heavyweight male sculler in one session.

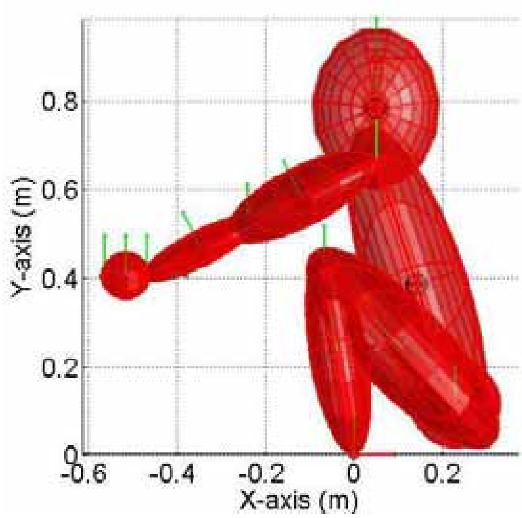

Figure 1: Rower model. The ellipsoids represent the inertial properties of the body segments.

RESULTS AND DISCUSSION

The resultant shell acceleration trace (Figure 2) from the initial attempt in simulating the rower motion does show similar characteristics to the measured shell acceleration trace (Figure 3). Further fine-tuning of the rower motion description is now in progress.

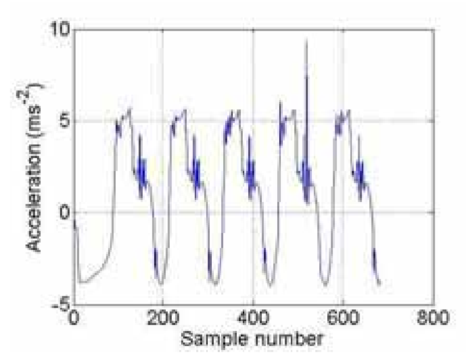

Figure 2: Simulated shell acceleration trace.

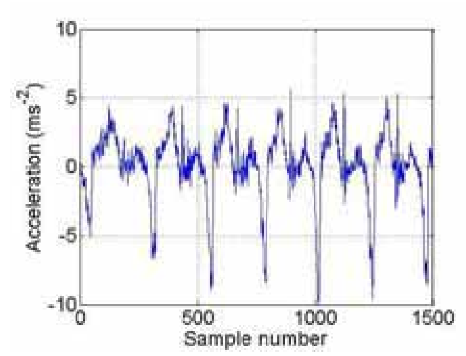

Figure 3: Measured shell acceleration trace.

CONCLUSION

The variability of the shell acceleration profile of each stroke reflects the rower's consistency. The model is an important step towards understanding the measured acceleration profile and relating the variability in the shell acceleration profiles to the timing of the rower's motion.

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