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# GaitSym V3.0.0 New Features

Gait Simulation using Multibody Dynamics

## INTRODUCTION

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There are two main differences between version 3 and version of 2 of GaitSym. Firstly, and most obviously, there are a lot of new options in the config file that allow you to specify new elements of the model. Of particular interest are the new Reporter and Controller elements. These are detailed in the manual and listed here. However there are also some major under-the-hood improvements which may be less obvious but which will make a difference. The biggest change is the adoption of more modern graphics card coding practices. This means that the display is much faster on modern cards. However it also means that the programme probably will not work on very old cards. Saying that I have not managed to find a computer that did not work so I think anything less than 5 years old will be fine and probably anything less than 10 years old will also be perfectly OK. The source code has also been cleaned up a little to allow some of the new features to be implemented efficiently and the custom version of OpenDE has also been modified so if you wish to recompile the code then you will need to use the new version. As before precompiled binaries for both MacOSX and Windows are available. There are also some interface changes that mean that the visual appearance of the model can be adjusted much more easily.

## INTERFACE CHANGES

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1. BadMesh is no longer specified globally using the on screen checkbox but instead is defined using the "BadMesh"="true" option on a BODY by BODY basis.
2. The display can optionally include a Framerate to show the current graphics card refresh rate.
3. New output options to accommodate extra joints plus task specific Reporters.
4. Built in Quicktime output and fixed window sizes to produce standard resolutions (e.g. 1080p)

## CONFIG CHANGES

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### IOCONTROL

*OldStyleOutputs* option removed.

New *SanityCheckLeft*, *SanityCheckRight*, *SanityCheckAxis* options for sanity checking symmetrical models.

### INTERFACE

Almost all the control options are now set by a Preferences pane in the GUI. Drawing order is no longer used and instead all objects are sorted by transparency before drawing and the the most opaque objects are drawn first. This is not perfect but is a good compromise between speed and the transparent effect.

### BODY

New body specific damping controls.

New *BadMesh* option to allow control of the bad mesh option on a per body level.

### JOINT

Added new joints: *Universal* and *AMotor*. There is also experimental support for joint limits in the *Ball* joint.

### MUSCLE

Muscle Cylinder directions can now be specified by axis instead of quaternion.

### REPORTER

These are a new way of getting custom data out of the simulation. Currently implemented are *Torque*, *Position* and *SwingClearance* reporters which can be used to investigate arbitrary locations, the torques and moment arms of specific muscles around joints, and can be used as simulation abort criteria if required.

## CONTROLLER

New *PIDMuscleLength* controller available.

## NEW MODELS

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A new base human model is available with rather better moment arms around the knee particularly and set using possible segment position definitions so that starting pose can be set more easily. It also includes a ball hip joint and a universal ankle joint.