MBS Benchmark A01: Simple Pendulum

Benchmark Objective

The NMS benchmark problem **A01** is a simple planar pendulum, proposed as a demonstration example.

Benchmark Description

The Simple Pendulum (Fig.1) is a planar mechanism composed of a point mass linked to the ground through a rigid massless bar. Tab. 1 reports system configuration. Gravity is the only force applied to the mechanism.

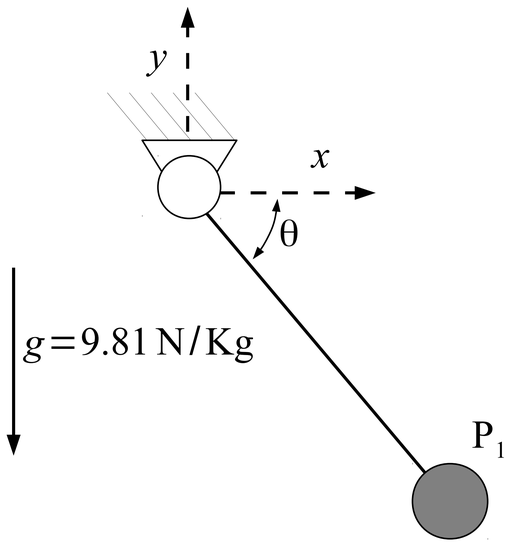

Figure 1: Simple Pendulum sketch.

P_1 mass	1.0 kg
Bar lenght	1.0 m
Bar mass	0.0 kg
$\theta(0)$	0.0 rad
$\dot{\theta}(0)$	0.0 rad/ s

Table 1: System Properties and Configuration

Results

The dynamic simulation of the **A01** benchmark was executed for 2000 s. In the initial position, the system is horizontal with P_1 x-coordinate equals to 1.0 m. Fig. 2 shows the outputs of OpenSim-based simulation and the benchmark references [1] for a 10 s period.

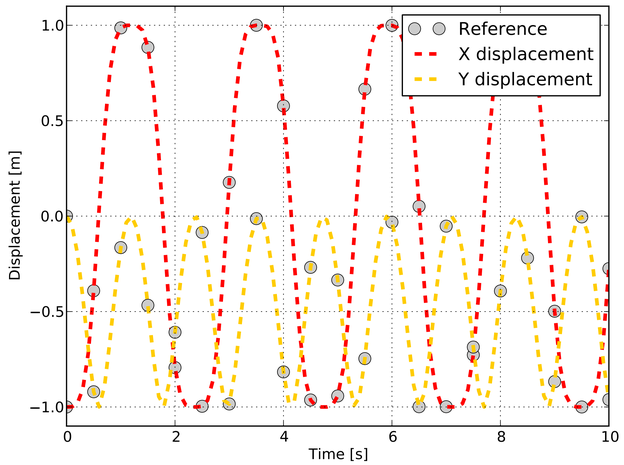

Figure 2: P_1 coordinate displacements in OpenSim simulation (dashed lines) and MBS benchmark reference (gray dots)

Download

- MBS Benchmark available at: `http://goo.gl/ySQ5me`
- OpenSim implementation available at: `http://goo.gl/R9tl3z`
- Videos of OpenSim simulation available at: `http://goo.gl/DIIWA7`

References

[1] M. González, D. Dopico, U. Lugrís, J. Cuadrado, *"A benchmarking system for MBS simulation software: Problem standardization and performance measurement"* in Multibody System Dyn., vol.6, no.2, 2006, pp. 179–190.

Contact Information

Rehabilitation Engineering Group
Department of Management and Engineering
University of Padua

- Web: http://reg.gest.unipd.it
- Email: reg.info@gest.unipd.it