

# A Planar Mechanical Library for Teaching Modelica

Dirk Zimmer

Deutsches Zentrum für Luft- und Raumfahrt.  
Münchner Strasse 20, 82234 Weßling, Deutschland  
dirk.zimmer@dlr.de

This paper presents a planar mechanical library that has been primarily designed for didactical purposes. The idea of such a library is that it is simple and easy to understand. In this way, the students can focus on learning the principles of equation-based modeling and they can avoid the lot of peculiar particularities that have meanwhile become part of the Modelica language.

We have used this library in the Modelica course at the technical university in Munich. The course is enlisted in the computer science department. Planar mechanical systems are ideally suited for teaching equation-based modeling, because their components are easy to model and to understand but the resulting systems are often complex in behavior and demanding in their computational aspects. Or to put it in short terms: you can do a lot of cool stuff by simple means.

Consequently, the paper presents also valuable examples for teaching: the chaotic motion of a double pendulum, a kinematic loop represented by a piston engine, and an inverse pendulum as example for control. Figure 1 presents the highlight for the students of the course: a planar two-track car model that can be visualized in 3D and steered by the keyboard input in real-time.

The planar mechanical library is freely available under the Modelica 2 license [1].



**Figure 1:** 3D-Realtime visualization of the two track vehicle

## References

- [1] Zimmer D. Virtual Physics. Lecture Notes available at:  
[www.robotic.dlr.de/dirk.zimmer](http://www.robotic.dlr.de/dirk.zimmer)