UM SOFTWARE LAB ANNOUNCES UNIVERSAL MECHANISM 4.0

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Laboratory of Computational Mechanics of Bryansk State Technical University announces **Universal Mechanism 4.0**. It contains some new additional modules and features.

1. New modules

1.1. UM Automotive

UM Automotive is an additional module and is intended for simulation of vehicle dynamics. The module includes two tire models, which describe dynamical forces and torques between a wheel and a road. Implemented models are widely used for simulation of vehicle dynamics and provide accurate solution in the case of adequate setting their parameters. UM Automotive contains a special tool for description of macro geometry of a road and road profile. Several mathematical models of driver and a set of typical maneuvers such as straight-ahead braking, double lane-change, braking in a turn, power-off reaction of a vehicle in a turn, power-off in turn, steady-state circular driving behavior and others (including ISO standards) are available. Analysis of vehicle dynamics with the help of such wide set of typical maneuvers helps you have a clear idea of dynamical behavior of the vehicle.

To compare and determine if there is acceptable agreement between simulations from Universal Mechanism and other computer-based modeling packages special verification was done. Two test models of heavy vehicles were created in different modeling programs and results of simulation their dynamics were obtained. National road transport commission of Australia carried out numerical experiments in ADAMS/CAR, UMTRI's constant velocity Yaw/Roll program and AUTOSIM and our laboratory did the same in Universal Mechanism.

More detailed information about UM Automotive is available at
http://www.umlab.ru/module6.htm

1.2. UM Rail/Wheel Wear

UM Rail\Wheel Wear is an additional module for prediction of rail\wheel profile wear. The prediction of profile wear is developed on the basis of the scanning tool (UM Optimization module). The user prepares a scanning project where the model of railway vehicle, initial profiles of wheel and rail, macrogeometry of railway track profile, etc. are set. Then the user sets the number of iteration of execution of the project. Wheel profile is modified after every iteration of the project according to tribological wear model. Four wear models are implemented in the module: Archard model, Specht model and two models proposed by VNIIZHT (All-Russian scientific-research institute of railway transport) specialists.

2. New features

UM Base. *Undo* and *Redo* features are now supported, a list of components is renewed, and collection of sample models is significantly extended. Functionality of animation windows is improved. As well as visual creating connection points and vectors is now supported. Fixed the OpenGL graphics initialization error that leads to necessity of decreasing hardware acceleration of graphical subsystem of a computer.

Some chapters from the "Getting Started" series are converted to Windows Help files and are available via UM Input program.
Some new built-in force models are added. They are Fancher leaf spring model and Nishimura air spring model.

UM Loco. There are following new features are added: movement along an arbitrary track profile and tool for analyzes of pairs of rail and wheel profile.

UM Optimization now supports simulation of road vehicles. Handling with large projects is simplified, visual description of objective function in "Optimization" tool is now supported.

UM FEM. Calculation of stresses and strains is now introduced, export of load files for ANSYS. ANSYS versions 5.1-10.0 are now supported.

UM Control. 13th Matlab/Simulink release is now supported, so 12th, 13th and 14th releases of Matlab/Simulink are supported (versions 6.0-7.0).

CAD interfaces. Data import possibilities from 3D documents from Autodesk Inventor, SolidWorks and KOMPAS are improved. Extended handling with assemblies and aggregation parts into rigid bodies are now supported.

3. Links

Universal Mechanism demo version you can download using the following link: http://www.umlab.ru/um40demo.exe.

The latest UM version as well as up to date UM user's manual available at http://www.umlab.ru/download.htm.

Please, send you bug report, questions and suggestions to um@umlab.ru.