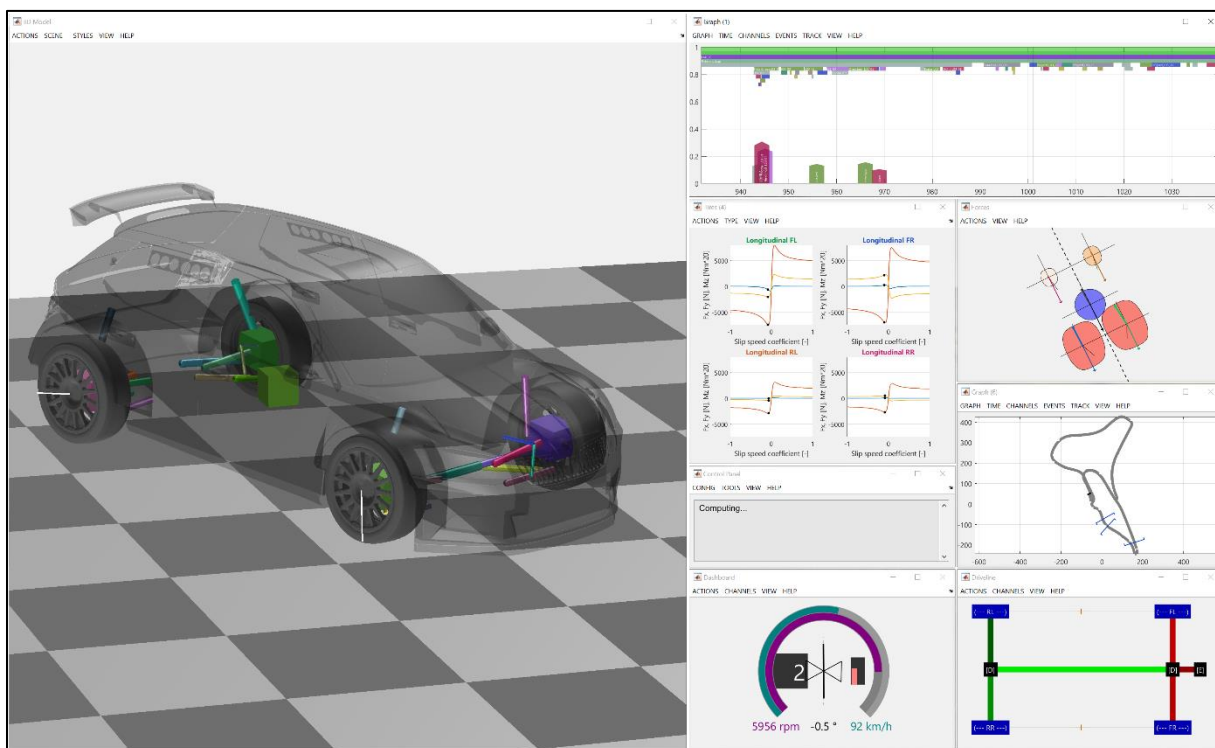


MBDATA

INTEGRATION OF EXPERIMENTAL DATA INTO MULTIBODY VEHICLE MODEL



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Purpose of the Application

MBDATA application is designed for advanced analysis of data got from gauging a moving vehicle. An integrated multi-body system is used as an essential part of the program. This system, by the means of a virtual dynamic model, enables to calculate quantities otherwise difficult or even impossible to measure.

Main Functions

The application includes a varied number of functions generally intended for efficiency improvement of a data analysis process. These functions cover all the principal areas, from raw data preprocessing to various filters, corrections and general mathematical functions, up to many types of quality visualizations and work with comments and reports.

Interactive Analytics Tools

Data of MBDATA application is presented in the form of channels, that can be variously named, sorted into the groups, diverse parameters can be set to them or comments added. The channels can be then projected in many types of charts or in analytics tools, which calculate and display filtered curves, statistics quantities, frequency spectrums and other useful functions in real time. All these operations are linked through the function of data cursor and active area selection.

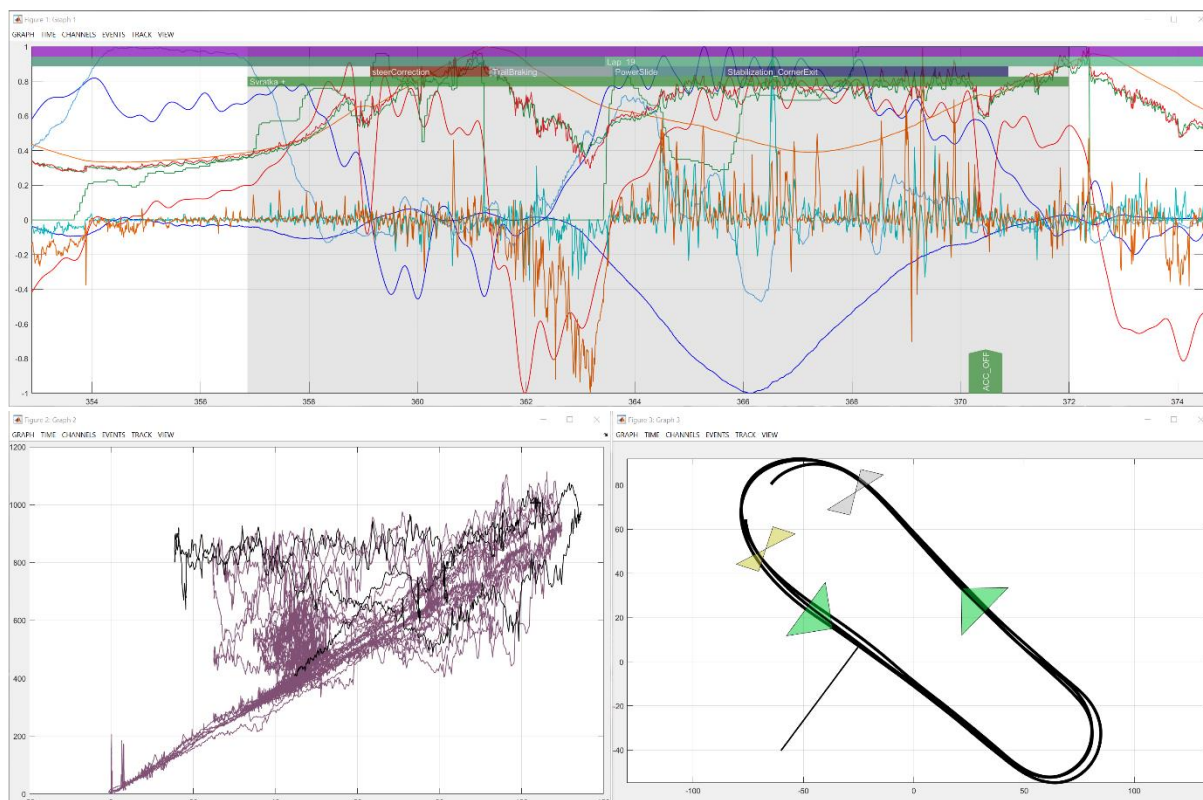


Fig. 1: System of interactive charts linked through the time selection.

Events Management and Reporting

The principal capability of the program consists in documentary function. Significant data areas can be indicated by way of the point or interval events, or for example as the points related to the particular position on a track. There is a possibility to write own comments to these events, or to insert links to the charts of one's own choice, which can be then promptly displayed, so the information value is increased significantly this way.

The events can be used in many other tools, where they can serve for example as a definition of areas designated for processing. There can also be created a consistent report from the selected group of events that can be used as a frame in preparing a Final Report or a live presentation.

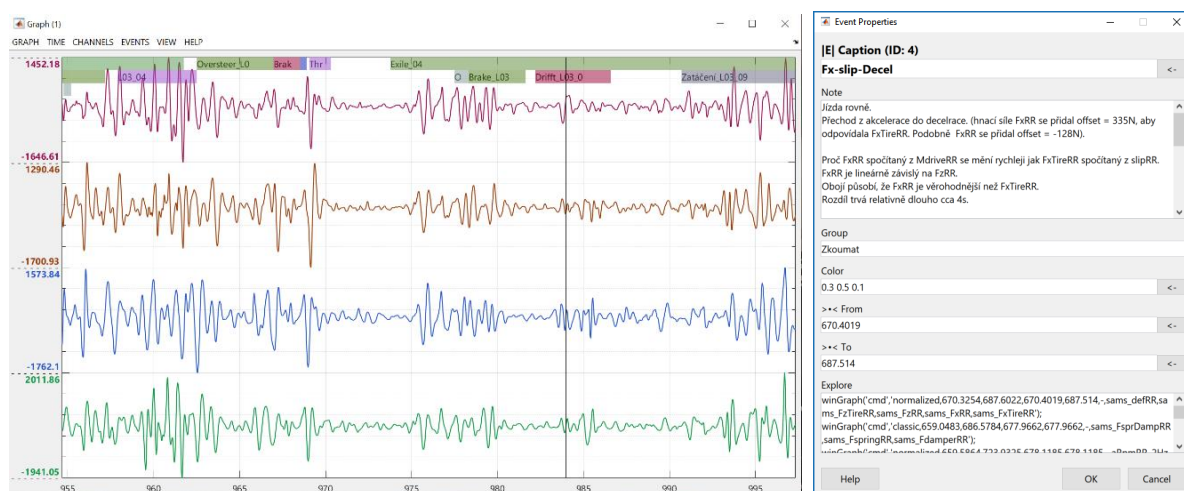


Fig. 2: Representation of events and editing their parameters.

Information stored in events or channels can be searched both within the current project as well as within all the projects of a selected file.

Integrated Multi-Body System

MBDATA application is quite uniquely characterized by its ability to combine gauged data with data calculated by the integrated multi-body model of a vehicle in the form of DLL library, which communicates with the main part of the program through application interface. The model can be very detailed, and this way accurately imitate the constructional solution of a given vehicle.

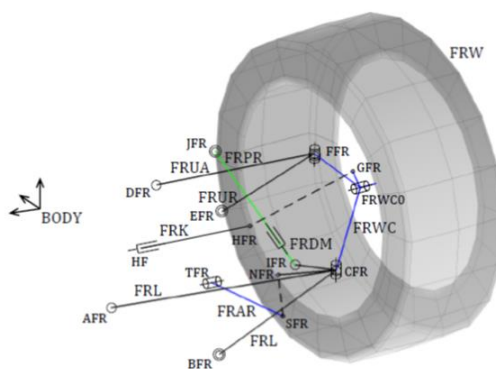


Fig. 3: Example of multi-body model of a vehicle axle.

Such an interconnection enables to calculate a complete dynamic state of a modelled vehicle based on data inputs (e.g., inertial unit outputs, GPS channels, positions and velocities of some parts of a vehicle) got from a measurement during the real drive of a vehicle. And this way we can gain and analyze quantities, which could not be measurable in practice (e.g., contact forces between the surface and the tire), or also some attributes, for which we would have to arrange expensive laboratory tests (such as damper characteristics or approximate parameters of tire models).

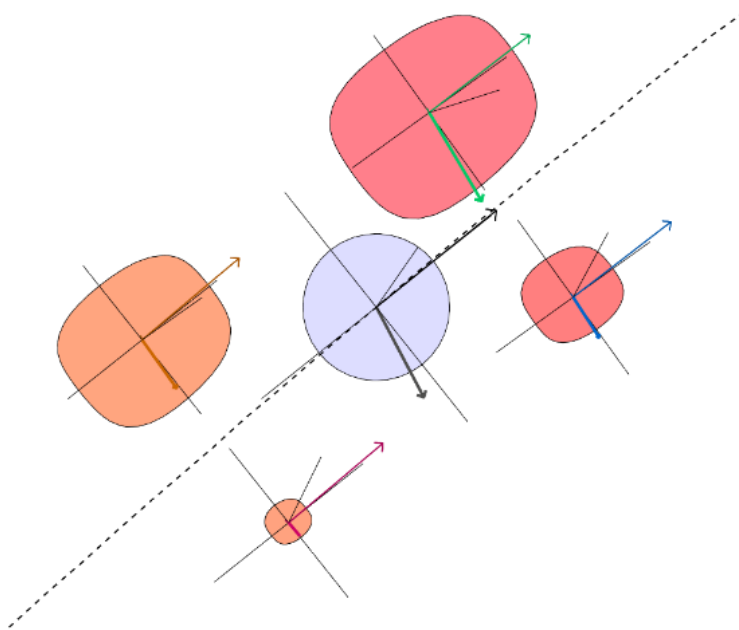


Fig. 4: Illustration of friction ellipses and speed vectors in the contact points of tires with a surface.

Technical Requirements

The software package MATLAB 2017b (or the later ones) is necessary for the use of application, which implies some hardware requirements as well (see

<https://www.mathworks.com/support/requirements/matlab-system-requirements.html>).

Link to the Projects

Project „Josef Bozek National Center of Competence for Surface Vehicles JOBNAC“, ID TN01000026, supported by the Technology Agency of the Czech Republic in the public tender „Program supporting applied research, experimental development and innovation of National Competence Centre 1“.

License Conditions

Other subjects are obliged to get license before the use of software.

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