Latest News in SIMPACK Wheel/Rail

NEW 2D STICK-SLIP ELEMENT FOR EMERGENCY SPRINGS

The Force Element 195 StickSlip 2D Contact has been available in SIMPACK for a long time. It is a 2D stick-slip friction element which allows lift. The normal force cannot have a nominal force applied due to this lifting. The next SIMPACK release will contain the Force Element 194, which is also used for the modelling of 2D stick-slip friction. This Force Element, however, does not allow lifting and therefore a nominal force can be applied, making it suitable for the simulation of emergency springs in air-springs in railway vehicles. The car-body rests on a sliding plate which is cushioned vertically with an elastomer. The element 194 has a vertical stiffness, damping and nominal force. The 2D stick-slip stiffness behaviour can be controlled in both the longitudinal and lateral directions. It can also be used as a standard friction element, providing lift doesn't occur, e.g. for Lenoir dampers in certain bogies in freight vehicles.

NEW IN THE TRACK MODULE

SIMPACK's cartographic Track is the easiest way to define a track which conists of straight sections, arcs, clothoids, superelevation and inclines. It is possible to enter the data directly in the GUI or, since 8.709, in the new SIMPACK cartographic track file format (extension .trc). The file format is easy to understand, allows data to be entered efficiently whilst minimising the potential for making mistakes. End radii used for transitional or curve elements can be automatically used as the initial radii for succeeding elements. This makes the copying and moving of track elements a lot easier to perform. The file format allows comments to be added to all of the defined elements, meaning the file is also a good documentation to the track. An example will be prepared in the standard database under „track_cartographic".
Moreover, in the next SIMPACK release version it will be possible to enter track excitations directly in ASCII format, saving the laborious task of converting them into binary format. Examples are also available in the directory „track_excitated". The binary format will of course still continue to be supported.

UNTRUE WHEELS

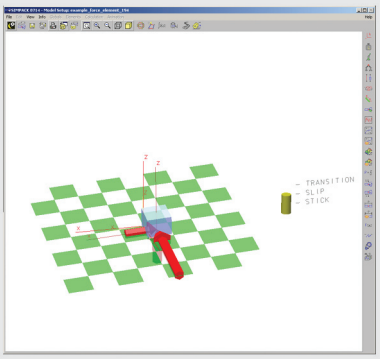
Untrue wheels, contrary to what one would expect, is a situation which often occurs in reality. The definition in SIMPACK has been made a lot simpler with 8.709. The important parameters are set in the Wheel Profile Reference Marker. There are three possibilities:

1. the radial differences can be entered as an input function with respect to the position on the wheel perimeter.
2. through Fourier coefficients.
3. the definition of a simple harmonic function.

The wheel untrueness can be used with any wheelset or independent wheel type (with the exception of wheels on a roller rig). For ensuring that the forces are correctly represented then either the wheelset axle or the entire wheelset should be modelled as a flexible body. The documentation for untrue wheels is found in the documentation for the Moved Marker type 99, Wheel Profile Reference Marker.

IMPROVED DERAILMENT RECOGNITION

The next SIMPACK release will offer better recognition of wheel-lift and derailed wheels. The user can set the simulation to terminate when a wheel raises more then 5 mm above the rail. The user can also set whether the simulation should be ended even if the wheel is still in contact or only when contact has been lost completely. The first setting represents the wheel climbing up the rail flange, the second when the wheel raises 5 mm off the rail, which can occur in rail twist tests. If this occurs then SIMPACK will return which wheel lifted and will terminate the simulation. This lifting effect is set in the ‚Contact Force' window from the ‚Vehicle Globals'. If this derailment setting is turned on then the constraint contact ‚Wheel Lift' recognition should be set to „Set Tx=Ty=0 and continue".



Stick-Slip Force Element for Emergency Springs

```
STR   50
CLO   10     0   400              'Entry Clothoid'
CIR   80     *                    'Circular Arc, re-use end radius of clothoid'
CLO   10     *     0              'Exit Clothoid'
STR   50                  s=0     'Station'
BLO   10     0  -200     s=0     'A Bloss ramp does not need a smoothing.'
CIR   80  -200          s=2     'But it may have one.'
BLO   10  -200     0     s=3
STR   50

CSL   80     0
PL2   20     *    30                          ! P_start (re-use end slope of CSL)
CSL   20     *               s=4
PL2   20     *     0
CSL   60     *
PL2   20     0   -20         s=0.5
CSL   30   -20               s=0
PL2   20   -20     0
CSL   80     0

CST   50     0
LIR   10     0  0.06                         ! u_start, u_end (in [m])
CST   80  0.06
LIR   10  0.06     0
CST   50     0               s=0     'Station'
BLO   10     0  -0.1         s=0
CST   80  -0.1               s=2
BLO   10  -0.1     0         s=3
CST   50     0
```

Cartographic Track File in SIMPACK Format