Adams 2014

Geometric Nonlinearity via Adams FE Part - Fully Integrated Inside Adams

1) MBD System Model
   + Centerline, Angle, Sections, Distributed loads

2) MBD Model + FE Part
   Simulation

3) FE Part Results
   - Continuous Stress/Strain/Deformation
   - Position/Velocity/Acceleration
   - Forces and Torques
Welcome to Adams 2014!

The Adams 2014 release delivers new functionalities and major enhancements in many areas, including Adams/Machinery, Adams/Car and especially Non-linear flexibility integration in system dynamics.

Highlights of the release include:

Native Nonlinear with FE Part
Adams Native Non-linear Part Modeling and Analysis

Adams Co-simulation Interface
Full co-simulation support for Adams and Marc

New Adams/Machinery Cam Module
Optimize Cam-Follower Early in the Design Stage

Adams/Car Enhancements:
• New Roll Stability Events- Study the roll over motion to provide a better driver and passenger protection
• FTire Animation- Animate FTire contact forces and tire deformation forces in Adams/Postprocessor
• SmartDriver Enhancements- Perform improved backwards driving for open loop events

For more details on this release, please review the Release Guide and the other manuals. Several examples are also available to help you use these capabilities.

Thank you for your continued support of Adams.

Adams Product Team
**Release Overview - Adams 2014**

**FE Part – Adams Native Nonlinear Part Modeling and Analysis**

The FE Part is a wholly Adams-native modeling object which has mass and is accurate for very large deformation cases (that is, geometric nonlinearity) of beam-like structures. The FE Part differs from the linear flexible body option within Adams/Flex in two significant ways: 1) it has the ability to accurately represent large deformations which the linear modes approach cannot and 2) its modeling does not require an FEA-produced file like the modal neutral file (MNF). The FE Part is differs from the beam force element in that it possess inertia properties. The inertia properties are specified using symmetric, consistent mass matrix which remains constant. The FE Part has the following formulation options:

- **3D Beam**: A three-dimensional fully geometrically nonlinear representation useful for beam-like structures. Accounts for stretching, shearing, bending, and torsion.

- **2D Beam (XY, YZ, or ZX)**: A two-dimensional geometrically nonlinear representation useful for beam-like structures whereby the centerline of the beam can be assumed constrained to a plane parallel to the model’s global XY, YZ or ZX plane. The 2D Beam can stretch or bend in plane. The 2D Beam will solve faster than the 3D Beam.

**Adams Co-simulation Interface - Full co-simulation support for Adams and Marc**

The Adams Co-simulation Interface (ACSI) is a new product for co-simulation between Adams and other codes. In this release the only supported co-simulation topology is that of an Adams model co-simulating with one or more Marc processes. Other topologies or other products are not yet supported.

The Adams-Marc co-simulation enables users to perform real co-simulation between Marc nonlinear FE technology with Adams MBD code. With that, MBD engineer can increase model accuracy by including non-linear structural behavior. Also, FEA engineer can study components with realistic boundary conditions. It’s also a huge time saving for nonlinear FEA users since with some of the rigid moving parts solved in Adams, the total solution time is dramatically reduced.

**New Adams/Machinery Cam Module – Optimize Cam-Follower Early in the Design Stage**

The new Adams/Machinery Cam module provides for the modeling of cam-follower systems within the Adams/View environment. These systems may comprise various combinations of cam shapes, follower motions, follower arrangements and follower geometry.

Adams/Machinery Cam provides modeling options for 2D and 3D motion as well as a constraint or contact based cam-follower interface. The module provides three primary modeling actions launched from the Machinery tab’s Cam container: follower motion construction, cam profile generation and camfollower system creation.
Adams/Car Enhancements:

New Roll Stability Events

Rollover accidents cause many fatalities. To provide a better occupant protection the study of the rollover motion becomes important. Adams/Car now provides three rollover events:

- **Embankment** - The embankment event helps you to study the vehicle behavior when driving over a small ramp followed by travelling down an embankment and rolling over before reaching a flat ground surface. A roll over bar with varying dimensions can be mounted on the embankment surface to enforce roll-over.

- **Corkscrew** - The corkscrew rollover event can be divided into three phases: the ramp phase, the airborne phase and the ground/sliding phase, and helps you to study the vehicle behavior when travelling up the ramp and rolling over.

- **Sand Bed** - The sand bed event is a lateral rollover event from the tilt table into a sand bed. Rigid road can optionally be used in place of a sand bed.

FTire Animation

FTire contact forces and tire deformation forces can now be animated within Adams/PostProcessor. This is done by outputting the Cosin Animation file (.ogl) and overlaying its animation on the rest of the Adams full-vehicle animation and/or by playing it in separate view within an Adams/PostProcessor page.
SmartDriver Enhancements

A number of enhancements to SmartDriver have been made in this release:

- Improved backwards driving for open loop events (for example, 3-point turn and parking maneuvers) supported by both simple and automatic powertrains.

- More speed profile spline interpolation improvements providing continuous target acceleration and smoother throttle and brake signals.