Version 971 R4.2.1 includes the following updates from the previous release R4.2

The items in this list are presented in no particular order (most recent listed first) and the list is not completely comprehensive.

For a draft of an updated 971 Users Manual, download
ftp://dyna@ftp.cadfem.de/manuals/ls-dyna_971_R4_manual_k-beta-June2009.pdf

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Elements

Fixed bug 2609 related to improper solid element deletion with auto sorting on.

Fixed a bug in type 17 shell: update thickness only after convergence.

Fix for bug 2570 related to beam to hex weld conversion when only a subset of beams are changed.

Fixed bug 2517 related to large oscillations and instability in single precision on some machines when zero length springs are present.

Fixed thick shells when used with orthotropic user-defined materials. Material direction transformations were wrong resulting in bad stress.

Fix for discrete cable beam time step calculation. Long time bug.

Fixed bug in Hughes-Liu shell so strains are output if more than 10 integration points are specified

Fix for bug 2458 related to degenerate solid type 3 into wedge elements.

Modify step calculation for discrete beam element to correct instability seen when nodal masses differ by a large amount. Bug 1960.

Fixed minor bug related to solid element type 18. Type 18 is for linear statics, not explicit.

Fixed a possible stability problem with discrete beams that have non-linear stress-strain curves and the final curve segment is stiffer than the others. This could result in such models running at a smaller time step.

Error terminate when scalar nodes are not defined in warped beams

Fixing reading bug for shell types 25, 26, 27

Fixed the calculation of angles for fully integrated thick shells to prevent seg fault.

Fixed bug in cohesive element warning message for thick shells

Fixed a material parameter related stability problem for the type 5 thick shell element.

Update the valid material check for forms 3 and 5 thick shells.

Fixed thick shell initialization of material types 54, 55, and 59.

Material

Set *MAT_083 time step choice back to 971 R3 value, fix bug in *MAT_083.

Bug fix for *MAT_187 time step calculation (solid elements only).
Bug fix for combination of *MAT_187 and hourglass type 6 (solids).

Fixed *MAT_123 for the case that ES7 or ES8 or EPS7 or EPS8 was a non-zero value. Elements were being deleted prematurely.

Fixed 2D beam element failure for material types 3, 15, 54, 58, 158, 65, 165 and 106.

Fixed shell *MAT_116 input so that it cannot seg fault.

Fix for bug 2608 related to multiple failure criteria in *MAT_ADD_EROSION applied to type 2 solids.

Fix energy bug in *MAT_187 for shells.

Modify muscle materials so that user defined curves can be used for activation levels.

Fix for *MAT_055 shear term in Tsai-Wu failure criterion.

Make *MAT_156 parameter ALM compatible with *DEFINE_CURVE_FUNCTION.

Allow *MAT_SPRING_MUSCLE parameter "A" (activation level) to reference *DEFINE_CURVE_FUNCTION.

Minor change for name of *MAT_224: *MAT_TABULATED_JOHNSON_COOK. Old name *MAT_TABULATED_VISCOPLASTICITY_WITH_FAILURE still works.
Fixes and minor modifications for *MAT_100_DA requested by Daimler.

Make user material and EOS work together in shells for 2-D plane strain and axisym.

Miscellaneous fixes for *MAT_224.

Fixed bug in MAT_024 user-defined failure (could result in improper material constants being used in failure subroutine).

Fix for *MAT_153.

Fixed brick element stress initialization of *MAT_057, *MAT_073, *MAT_083.

Fix for *MAT_077 when used with tet type 13 in single precision.

Fix for bug 2347 related to *MAT_187.

Fix for *MAT_159 related to internal energy calculation. Bug 2269.

Fix for *MAT_081 related to bug 2302 and parameter tdel.

***MAT_192 fixes for the initialization process; the most significant is that the density used for calculating maximum overconsolidation is now the buoyant density as per 971 R3. In previous releases of LS971 R4, the full density was used.**

Allowed *MAT_ADD_THERMAL for metal only.

***MAT_089: damping calculation was, in some cases, referencing an undefined variable**

Fix related to *MAT_126 related to switching solid element formulation to type 1 from 0 erroneously.

Small change for *MAT_100_DA with DG_TYP=4.

Accuracy fixes in single precision for C-S strain rate in *MAT_036 and *MAT_133

Small modification for *MAT_106: use last point in curve lrc instead of extrapolation to avoid possible negative base in Cowper-Symonds.

Fixed bug 2095: *MAT_COMPOSITE didn't work for adaptivity run

Fix for bug #2579 related to *MAT_ARUP_ADHESIVE and restarts.

***MAT_ARUP_ADHESIVE - Unit conversion of density was missed out for INCLUDE_TRANSFORM**

Fix for *MAT_195.

Fixed an error in the MCID option of *ELEMENT_SHELL that causes incorrect fiber directions. Also, changed behavior such that elements that use the MCID option ignore the material system that is determined by AOPT.

Contact

Added new *CONTACT_AUTOMATIC_BEAMS_TO_SURFACE

Added support for interference contact with segment based contact.

Fix for bug 2607. *CONTACT_2D_SLIDING_ONLY does not apply to 2d shell elements. An error message is printed at termination.

Fixed a serious bug in 2D tied contact that cause a lack of force balance when more than one tied contact appears in a model.

Bugfix in beam-to-beam contact

Fix for soft=4 contact and adapative constraints so soft=4 can be used in forming calculations.

Fixed a memory error when two surface force transducers are used with MPP segment based contact. The bug could cause a segmentation fault in single precision versions.

Added damping to stabilize the penalty formulation of sliding only contact.

Corrected the airbag thickness by load curve option for segment based contact. It was offsetting the contact surface by the total thickness instead of half the thickness.

Protect against divide by zero in new segment based contact penetration check and in new DEPTH=23 option.

Fixed 2 surface force transducer contact when used with segment based contact. It was possible for segmentation violation to occur.

Fixed PSTIFF=1 option on *CONTROL_CONTACT for SMP when mass scaling is used.

Output

Added output of swforc file (and binout) for the nugget pull-out failure function and fracture failure function of option 9 beam spot weld failure.

Fixed for output of 10-node tet nodes to d3plot (SMP).

Fixed sign error in bndout forces for implicit

Fixed bug 2669 related to *DATABASE_HISTORY_DISCRETE_SET and *SET_DISCRETE.

Fixed bug 2253: glstat reports incorrect controlling element.

Write solid formulations -1 and -2 to d3hsp.

Minor fix to D3PROP output

Fix implicit's output to rcforc file.

Fix problem of SMP writing interface linking file

Fix problem of SMP when writing intfor file.

Fix up resultant forces for constrained nodal rigid bodies to fix bug 2227.

Fix for crazy accelerations in nodout file if the interface force file is active.

Fixed bug for acceleration in nodout if *ELEMENT_SEATBELT_ACCELEROMETER is used.

Fixed format for spotweld stress output control information. Global is the default.

Fix bug which causes discrete element forces not to be added to the d3plot file.

Fix a restart problem with *DATABASE_BINARY_BLSTFOR.

Fixed bug for d3part whereby all element numbers were changed.

Allow printing of nodal contact forces in *INTERFACE_SSI and *INTERFACE_SSI_STATIC

Write density rather than temperature to blstfor.

Fixed extra history data output for type 2 and 3 thick shell elements.

Fix for d3hsp output of *PARAMETER names.

Fixed wrong strain output for one-point integration shell

Skip reporting contact time step for segment based contacts.

Loading and Boundary conditions

Fix a potential problem with pressure loading being applied to shell element segments after they have failed. This could only have happened if there was more than one pressure load applied to a segment or if the element was a 2D continuum element with more than 1 edge loaded.

Airbag

Allowed heat convection from bag to the environment only.

Fix to *AIRBAG_HYBRID leakage in case where some parts have negative CP23 and don't belong to airbag being considered.

Disable CPM particle (*AIRBAG_PARTICLE) data output to d3thdt.

Change of CPM particle to fabric PV work calculation by nodal velocity instead of fabric segment average velocity by Lars

Implement molar-fraction based airbag inflator input for *AIRBAG_HYBRID.

Use current area, in stead of original area, when calculating autolive leakage area.

Bug fix for treating non-closed airbag volume -- MPP only

Add particle friction for CPM.

Bug fix for read in AIRBAG_PARTICLE cards and give warning message if nonlinear cp is not a monotonic function within gas termperature of operation -- MPP only

Fixed bug for particle gas dynamics with heat convection involved

Added extra check to avoid some expensive iteration for particle cone angle

EFG

Fix for restart in 3D EFG adaptivity with formulation 7.

Bug fixed in EFG local adaptivity.

Added MPP support for EFG solid restart (bug 2623 solid part).

Bug fixed in restart for adaptive EFG.

MPP support for EFG shell 41 restart (bug fixed for 2623 shell part).

Add options in data transfer for adaptive EFG method.

Fix for time step control in EFG 3D adaptivity from hex to tet.

Added pressure smoothing in adaptive EFG in 4/8noded switch.

An improved adaptive EFG in local boundary integraion.

Bug fixed in irreversible unloading for EFG fracture.

Bug fixed in crack closure (EFG)

Bug fixed for fracture in elastic material (EFG).

Added one control parameter in EFG fracture.

Fixed bug in EFG *INITIAL_SPRINGBACK_SOLID read/write.

Bug fixed in EOS for EFG 2D and 3D (hex).

SPH

SPH Update
1: Fix bug in START and DEATH time per part for SPH.(Bug #2224)
2: Fix a bug for *MAT_059 for sph elements.
3: Implement *MAT_022 (*MAT_COMPOSITE_DAMAGE) for SPH 3D elements.
4: *SECTION_SPH_TENSOR : Write an error messag in case this option is used with material other than *MAT_NULL

Implicit

Fix for discrete beam problem which did not converge implicitly. Bug 2582.

Make implicit 2d-type solid, type13 and type 15, available for *MAT_076 and *MAT_175

In implicit, added kinder, gentler logic for processing of
(1) prescribed motion on globally constrained nodes and rigid bodies,
(2) redundant local spc constraints

Rigorous treatment of shell-to-solid interface for implicit.

Add implicit support for *CHANGE_BOUNDARY_CONDITION

Remove inappropriate warning from implicit about *interface_component.

Enhance Implicit's treatment of shell-to-solid constraint.

Implicit's treatment of shell-to-solid constraint.

Fix errors in implicit rbe3 constraints

Thermal solver

Add info when thermal linear solver 3 fails.
Bug fix affecting problems with highly nonlinear heat capacity such as phase change problems.

Fixed thermal work due to friction in segment based contact.

Bug fix for user material with thermal coupling

Fixed 2D thermal contact. It was likely to segmentation fault.

MPP only

Fix MPP restart with *CONSTRAINED_TIED_NODES_FAILURE, bug 2649

Fix MPP restart for thermal using direct solver.

Fix bug 2591: MPP did not consider rigidwall welding velocity WVEL.

MPP fix for drawbead box generation.

MPP support for enhanced blast=4 IGNID.

Fix the case of enhanced blast NIDBO=0 for MPP. scr files were written with nidbo=-1 in which case neither the intended xbo,ybo,zbo or nidbo was used.

MPP fix for soft=4 contact along with adaptive constraints.

MPP support for NIDBO in *LOAD_BLAST_ENHANCED.

Fix for CPM with MPP pre-decomposition

Better fix for MPP input problem (bug 2492) with rigid walls having stick conditions

MPP fix to make sure third beam nodes are written to the dynain file.

Fixes to MPP groupable contact and adaptivity

Fix initial and ambient hydrostatic pressure setup -- MPP only

MPP contact damping: was only being applied when nodes are approaching the surface, instead of both ways (as SMP does). This should make the behaviors more consistent, and be more stable.

Fix for inconsistent results in hybrid SMP mode -- MPP HYBRID only

Fix bug in 3D SPH lagrangian formulation (MPP only)

Fix some MPP initialization problems related to interface linking and tied node pairs.

Implement 3D total lagrangian formulation for SPH elements (MPP only)

Bug fix for shell edge contact -- MPP only

MPP fix for KE inconsistancies in glstat due to summation of rotational energy on shared nodes.

Fix MPP full deck restart bug related to minimum timestep.

Fix for MPP full deck restart and sliprings, and force output plot state at beginning of second run for full deck restart.

MPP support for accelerometers in full deck restart, which were not properly preserving history

Fix for MPP groupable contact interface energy calculation.

MPP fixes for retractors and sensors with full deck restart

Fixed the volume calculation for control volume airbags that have holes in the mesh. (MPP only).

Fixed airbag thickness by load curve option for segment based contact (MPP only)

Fix typo that caused MPP full deck restart to not properly re-initialize thick shell elements when using more than 1 processor.

Improvements in MPP grouable contact:
Changes to improve stability. Fixed problem whereby not all nodes were being considered in the energy calculation for groupable single surface contacts, and the sliding energy in glstat was wrong.

Possible floating point exception in groupable contacts, including automatic_tiebreak, Fix for bug 2593

Fixed bug for contact_entities checking (MP only).

Fixed bug 2697. Output d3part was corrupted. (MPP only).

A bug fix for bug #2013 for version R4.2: MPP crashes on an implicit general adaptive problem

Misc

Allowed mutilple entries for *INCLUDE and *INCLUDE_PATH.
For example,
***INCLUDE**
include_file1
include_file2
include_file3
***INCLUDE_PATH**
include_path1
include_path2
include_path3

Allow number of points in *DEFINE_CURVE greater than 99999

Corrected a bug calculating shell stress in a stress-activated *SENSOR.

Fix restart for implicit joints. Bug 2617 –

GM filter not restarting properly. Fixed bug 2642

SMP tiebreak surface to surface was affected by node order. Fix bug 1666

Change the behavior of the command line option ncpu=#.
Case 1: ncpu=-n negative number of CPU's
The code will always turn on the consistent option (CONST=1).
It will override the consistency flag on *CONTROL_PARALLEL if it exists.
Case 2: ncpu= n positive
If there is no *CONTROL_PARALLEL, CONST=2 as default.
If there is *CONTROL_PARALLEL, it uses the value of CONST on this card.

Disable NCPU option on *CONTROL_PARALLEL or control card 16. Print a warning if the user defines this option.
***** Warning in keyword *CONTROL_PARALLEL**
NCPU option will be obsolete and ignored in the next release
Please use ncpu=# on the command line # or *KEYWORD card.
***** Warning in 16th control card:**
NCPU option will be obsolete and ignored in the next release
Please use ncpu=# on the command line.

Fix bug 2476. Whereas material stress relaxation curves are defined in the input as stress versus time, *INCLUDE_TRANSFORM incorrectly transformed the curves as stress vs. log(time).

Fix for *CONSTRAINED_INTERPOLATION so that division by zero is avoided when no rotational dofs are present.

Correct some minor 2D (4-node) seatbelt element issues.

Made 2D seatbelt improvements, triggered by setting COMP, the 6th column of *MAT_SEATBELT, to 2. Improvements include synchronization between 1d and 2d belt, automatic adjusting compression elimination, and seatbelt section force output.

***PERTURBATION_SHELL_THICK: fix bug for different section properties**

Fix the extraction of resultant forces for the implicit treatment of joints for explicit - bug 2505.

Make pore air available for solid formulation=0

Fixed bug in pore pressure analysis that could prevent convergence of steady-state analysis type on MPP systems

Fix bug that caused steady-state pore pressure analysis to terminate early when end of construction stage was reached

Bug fix for pore pressure analysis – stability calculation for steady-state was not always correct

Fix bug in pore pressure analysis. If suction builds up first, then the analysis is switched to steady-state, it could fail to converge.

Fix bug in pore pressure analysis when nodal rigid bodies are present and the model contains wedges or tets with automatic sorting

Bug fix #2307.

Bug fix for trimming: When deleting trimmed nodes, *SET_NODE_LIST_TITLE was not correctly read.

Added new option "NOSOL" for *CONTROL_TERMINATION (Column 6):
Flag for a "non-solution" run, i.e. normal termination directly after initialization (transformation, mapping, trimming, mesh check, ...).

A bug fix for ALE ambient type 5. (LOAD_BLAST)

Added new option for *CONTROL_ADAPTIVE, ADPSIZE .LT.0:
Absolute value defines the minimum characteristic element length to be adapted based on square root of element area. I.e. instead of comparing the shortest element edge with ADPSIZE, it compare the square root of element area with abs(ADPSIZE) if ADPSIZE is given by a negative value.

Permute angular rates for yaw, pitch and roll in *INITIAL_VEHCILE_KINEMATICS so they are in agreement with the user's specification of body-fixed axis sequence. Some adjustments to rigid body mass center positioning with regard to gravity direction. Calculation of velocity field is based on the final mass center position.

Allow for gravity to point in positive global directions and maintain max coordinate values in that direction when repositioning with initial vehicle kinematics.

Added error termination if SIDR in *DEFINE_CURVE has an illegal value. Related to Bug report 2419.

Fix for bug 2301 related GM filter for seatbelt accelerometers.

Fix for full deck restart related to bug report 2349. This involved solid type 5.

Fixes for mapping with *INCLUDE_STAMPED_PART.

Released the 4-digit limit for the number of local coordinate systems.

Bug fix for element sorting. Combination of *CONTROL_SOLID: ESORT=1 and *CONTROL_SHELL: ESORT=2 was not correctly working.

Fix restarts with USA coupling

Bugfix for restart with ground motion

Fixed bug affecting staged construction models containing nodal rigid bodies and shell elements

Added DEFINE_CURVE_DUPLICATE.

Added seatbelt slipring friction decay constant.

Save/restore plot times for ascii files in full deck restart file. This fixes a problem where the ascii files were output EVERY CYCLE for a while on restart.

Fix for SSR in shape function calculation.

Fix related to contact generation. The error was caused by confusion between DEFINE_BOX and DEFINE_CONACT_VOLUME.

***DEFINE_BOX_DRAWBEAD with CID>0 was broken in some cases.**

***load_blast + ALE coupling with area weighted nodal velocity**

Fix problem in reading beam node list from wrong contact definition for single surface contact -- MPP only

Use area weighted nodal velocity for ALE+LOAD BLAST coupling to avoid edge effect

1. Allow *INTERFACE_SSI for purely dynamic analysis, i.e. without starting from an initial state
2. Add tensor viscosity coefficient to *MAT_PML_ELASTIC_FLUID

Fix for large ID's in EDGSET of *SECTION_SHELL.

New option "POS6P" for *DEFINE_TRANSFORMATION. This is an affine transformation (rotation and translation, no scaling, no shear) given by 3 start points and 3 target points.

Fix for mapping with *INCLUDE_STAMPED_PART.

Compute density in the shock front and post-shock for load_blast_enhanced.

Allowed the user to define parameters in *TITLE or _ID line. The code will try to translate all defined parameters. If any error encountered, no error message will be issued and it will continue.

Bug # 2075 fixed. Combination of *INCLUDE_TRANSFORM offset and *ELEMENT_SEATBELT_ACCELEROMETER parameters IGRAV and INTOPT.

Bug # 2073 fixed. Combination of *INCLUDE_TRANSFORM offset and *MAT_057 load curves.

Fixed the reading of *INITIAL_STRESS_TSHELL and *INITIAL_STRESS_SOLID when the history data contains integers.

Compute blast wind velocity directly from the incident wave decay parameter rather than ratio of pressures.

Fixes for encrypted input: seatbelt materials, *KEYWORD inside the encrypted block, and proper handling of *COMMENT cards

Fixed initialization bug for umats using both ortho + part damping

Fixed reading *INITIAL_STRESS_TSHELL history data in large problems.

A fix to the Mach stem incident pressure (*load_blast_enhanced).

MPP fixes for INTERFACE LINKING "tied node pairs" option,

Fix for hexahedron remeshing by Philip Ho.

Fixed keyword read of FTENSR in *INTERFACE_SPRINGBACK

Fixed problem in *set_segment_general where first part ID is 0 causing all parts to be included in the contact.

Fixed bug in contact mapping for adaptivity run (SMP only).

Fixed erroneous PML block assignment for arbitrary material numbering

Removed unnecessary check for duplicate node that was causing problems

Added birth and death times to auxiliary ground motion read in from INTERFACE_SSI

Fixed problem in single precision INTERFACE_SSI due to precision mismatch.