

# INTEGRATED ENGINEERING SOFTWARE

## VERSION 9.3 UPDATES

### SEPTEMBER 2016

This document summarizes updates to INTEGRATED version 9.3 programs between July 1<sup>st</sup> and September 15<sup>th</sup> 2016. This update consists mostly of progressive bug fixes.

|  |          |
|--|----------|
| INTEGRATED ENGINEERING SOFTWARE VERSION 9.3 UPDATES                  | 1        |
| SEPTEMBER 2016   | 1        |
| <b>Bug Fixes</b>   | <b>2</b> |
| All Programs   | 2        |
| ELECTRO  | 3        |
| Coupled (Multiphysics) Programs (e.g. Inducto, Electro/Kelvin, etc.) | 3        |
| LORENTZ 3D   | 3        |
| <b>Program Improvements</b>  | <b>3</b> |
| ELECTRO & COULOMB (or “Electric Mode” in Multiphysics Programs)      | 3        |
| <b>New API Functions</b>   | <b>4</b> |
| File Operations  | 4        |
| JUNE 2016  | 5        |
| <b>Bug Fixes</b>   | <b>5</b> |
| All Programs   | 5        |
| ELECTRO  | 5        |
| OERSTED & 2D Eddy Current Mode                                       | 5        |
| All 3D Programs  | 6        |
| COULOMB & 3D Electric Mode   | 6        |
| AMPERES/FARADAY & 3D Magnetic Mode                                   | 6        |
| All LORENTZ  | 7        |
| LORENTZ 3D   | 7        |
| APRIL 2016   | 9        |

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|  |           |
|--|-----------|
| <b>Bug Fixes</b>                           | <b>9</b>  |
| All Programs                               | 9         |
| All 2D Programs                            | 9         |
| ELECTRO & 2D Electric Mode                 | 9         |
| MAGNETO & 2D Magnetic Mode                 | 10        |
| OERSTED & 2D Eddy Current Mode             | 10        |
| KELVIN & 2D Eddy Current Mode              | 10        |
| All 3D Programs                            | 10        |
| COULOMB & 3D Electric Mode                 | 10        |
| AMPERES & 3D Magnetic Mode                 | 11        |
| FARADAY & 3D Eddy Current Mode             | 11        |
| CELSIUS & 3D Eddy Current Mode             | 11        |
| All LORENTZ                                | 11        |
| LORENTZ 2D                                 | 12        |
| LORENTZ 3D                                 | 13        |
| <b>New API Functions</b>                   | <b>14</b> |
| Geometry Functions                         | 14        |
| Physics                                    | 14        |
| LORENTZ                                    | 14        |
| Magnetic                                   | 15        |
| Electric                                   | 15        |
| <b>Other New Features and Improvements</b> | <b>15</b> |
| Graph Window Mouse-Over Data Point         | 15        |
| Improved DXF Import                        | 16        |

## ***BUG FIXES***

The following list provides a brief description for bugs that have been fixed since the June 30<sup>th</sup> 2016 update of version 9.3. Most bugs are model and program specific so the details are not helpful. The odds that any of these bugs as reported and fixed were affecting you are very small. However, the progressive fixing of even obscure bugs leads to overall better program performance.

### **All Programs**

- The data in a graph and an output file would match, but when examining the pop-up data table a few entries would show the wrong exponent.

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## **ELECTRO**

- In capacitance mode the restriction of 32 conductors (32x32 matrix) was removed. Various crashes with larger numbers were found and fixed.

## **Coupled (Multiphysics) Programs (e.g. Inducto, Electro/Kelvin, etc.)**

- Once a model had been setup in more than one mode there would be some random seeming crashes when volumes were deleted.

## **LORENTZ 3D**

- Some models were found where some of the secondary rays emitted from surfaces would propagate on the opposite side as the incoming ray.
- The new graph utility was not enabling lines to be drawn connecting the dots of a scatter plot.

## ***PROGRAM IMPROVEMENTS***

The following list provides a brief description for improvements made since the July 1<sup>st</sup> 2016 update of version 9.3.

## **ELECTRO & COULOMB (or “Electric Mode” in Multiphysics Programs)**

- Capacitance and conductance matrix calculations were previously limited to 32 conductors, hence a 32x32 matrix. This limit was removed.
- Allowing for very large numbers of elements in the capacitance matrix revealed some inefficiencies in how the calculations were done. Once those were removed the calculation of large matrices was much faster, speed improvements by a couple of orders of magnitude were found on test cases with hundreds of conductors.

## ***NEW API FUNCTIONS***

API functions can be introduced as required by specific users much more readily than functions that affect the interfaces because their influence on the rest of the program is much more limited.

### **File Operations**

- `File_OpenTemplate(LPCTSTR sName, SHORT* iErr);`  
Enables you to open a template with preferred settings. This is especially useful after making a new model or open a CAD file.

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## **JUNE 2016**

This document summarizes updates to INTEGRATED version 9.3 programs between April 14<sup>th</sup> 2016 and June 30<sup>th</sup> 2016. This update consists of progressive bug fixes it doesn't introduce any new features.

### ***BUG FIXES***

The following list provides a very brief description for bugs that have been fixed since the April 4, 2015 update of version 9.3. Most bugs are model and program specific so the details are not helpful. The odds that any of these bugs as reported and fixed were affecting you are very small. However, the progressive fixing of even obscure bugs leads to overall better program performance.

### **All Programs**

- Support Request from Help Menu wasn't reliably passing complete license information
- View Limits sometimes did not update with geometry changes
- Some derivative graphs gave bad shapes when fit with a spline
- The Field Analysis Result dialog was limiting graphs to 10,000 data points

### **ELECTRO**

- Opening some models was crashing the program

### **OERSTED & 2D Eddy Current Mode**

- In transient mode the Phase offset for Harmonic Sources wasn't working

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## All 3D Programs

- When working in 2D mode the Reference Coordinates u, v were not properly parsed.
- In one model a volume that was merged in was lost on saving
- In one model the geometry disappeared when shading was changed to 'Very Fine'.
- In some models there was a problem with creating a volume when sweeping a surface by 360 degrees.

## COULOMB & 3D Electric Mode

- The API function Geometry\_DefinePlanarSurface\_FromSegments wasn't returning the surface number
- In some models displacing a volume with physical properties wasn't invalidating the solution
- Defined Graph Problems when Deleting a Region
- Had spacing problems with locations for launching streamlines from very long skinny surfaces

## AMPERES/FARADAY & 3D Magnetic Mode

- In a model with a very esoteric coil shape the field didn't satisfy Ampere's Law
- Permanent Magnet Display Arrows Do Not Show Up For Short Extruded Model
- Streamlines stopped prematurely in some models
- Streamline Plots were not saving consistently in the Output Manager
- Was getting a null solution in some windings models

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## AII LORENTZ

- Marker data displayed wrong for a reflecting point

## LORENTZ 3D

- Very few rays launched in some models.
- Fixed some problems with missing ray intersections with Secondary Emitters
- Beam contour plot data wasn't exporting correctly
- There were problems with the API function GetBeamCenterAndDiameter with Center Type = 0
- The Structured Emitters Checkbox setup was sometimes failing to save correctly.
- Some models lost the solution when they were saved
- In some models it was much slower to solve one ray than two or more.
- The setting Utilities>Setting>Numbers wasn't affecting the formatting of beam output files





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## APRIL 2016

This document summarizes updates to INTEGRATED version 9.3 programs between April 17<sup>th</sup> 2015 and March 31<sup>st</sup> 2016. Some changes apply to a wide range of programs, some are very specific to certain programs and models.

### ***BUG FIXES***

The following list provides a very brief title for many bugs that have been fixed since the release of version 9.3. Most bugs are quite model and program specific so the details are not helpful, the odds that any of these bugs as reported and fixed were affecting you are very small. However, the progressive fixing of even obscure bugs leads to overall better program performance.

### **All Programs**

- STEP Files Don't use the Length Unit
- Mouse-wheel zooming does not work when selecting points for PD Inception
- Names in Objects dialogue often cannot be seen – path too long
- Spline or NURBS Line on a Graph is broken
- Crashing problem related to circularly sweeping a segment by 360 degrees
- Parametric post-processing that was deleted re-appears in new parametric definition
- Solution doesn't invalidate after changing frequency or materials with API functions
- Plots are just Black and Red
- Contour plot is missing a piece
- Crash when searching from File>Open
- Ferromagnets.mlb is missed in some magnetics programs
- Physics>Volume Conductors doesn't display properly

### **All 2D Programs**

- Element dot size can't be changed
- Validating parametric destroys the solution

### **ELECTRO & 2D Electric Mode**

- Cannot solve E field in this 2D model

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- Unit confusion when outputting from the Graph in the Old Format
  - New PD Inception Graphs have problems
  - Analysis\_GetStreamlineData2 Fails in v9.3

## **MAGNETO & 2D Magnetic Mode**

- Plunger Model Outputs
- Inappropriate FEM use with the Auto solver setting
- Animation related issues in a Magneto model

## **OERSTED & 2D Eddy Current Mode**

- No Solid or Gradient Colors for contour plots in Define Outputs
- Translational Transient model crashes when you re-solve
- Oersted 6.4 Model Crashes Newer Programs

## **KELVIN & 2D Eddy Current Mode**

- KELVIN Model with unreasonable linear results

## **All 3D Programs**

- Crash Making Arrow Plot in Box
- 3D Box Selection
- Merge Surface crashes in this model
- Geometry Viewing Issues with a Defined Plot Displayed
- Segment Appearance in the Middle of the Mirror Command
- Graph Labels When Section View is On
- API Function Which Hangs Version 9.3
- Volumes not selectable in this model
- Volumes cannot be joined in this model
- Inappropriate Material Coloring in Grid Model
- Appearance of Scatter Plots on Surfaces
- Missing Geometry in New Versions

## **COULOMB & 3D Electric Mode**

- FEM solver crashes in this Transient model
- Recovered database doesn't remember Transient mode
- Problem Size Tool Versus Actual Solving

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- Crash Trying to Fix Geometry
  - Model geometry disappears after making a contour plot
  - FEM Mesh Ignores my Boundary
  - Display Segment Voltage

## **AMPERES & 3D Magnetic Mode**

- Analysis Fail (surface require elements) in this model

## **FARADAY & 3D Eddy Current Mode**

- Velocity Arrows are Out of Place
- Assign Conductor Current to a number greater than 32
- Wrong Direction to Assigned Current
- Problems with the new Inductance API Functions for Efacec
- Line Break Exporting Large Inductance Matrix to a File from the API
- Vortex: Direction of Coil
- Display of Volume Conductors

## **CELSIUS & 3D Eddy Current Mode**

- Problematic Crashing with Celsius Model

## **ALL LORENTZ**

- Problem after invalid ray selection
- Sporadic appearance of the Discrete Point Emitters Dialog
- Crash Trying to Get to Beam #1 in the Solution Details Dialog
- E Field Scale is Wrong
- Time Scale Doesn't Reset
- Crash While Isolating Rays
- Crash Just by Open and Close Lorentz
- Trajectory Solver Dialog During a Parametric
- {Add} Grayed Out After Showing Properties for Measurements
- Crash at End of Parametric
- Log Scale Colors the Rays Exactly the Same as Linear Scale
- Solution menu items not greyed out with Parametric Setup window open
- Trace by Marker
- Cannot Select Rays Interactively Anymore

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- Multiple Particles Not Working
  - Lingering Selection After Solution>Trace Along Ray
  - Some Lorentz Versions Are Tied to the Field Solver Program for Registry and Files
  - Ray Transparency with Property Based Coloring
  - Assigned Current After Switching Regimes
  - Synchronize the selected ray between Tabs. Always have selected ray highlighted.
  - Lorentz2EMv92 Model Crashes v93
  - Different Colors Assign Randomly
  - Default Magnetic Materials are Included in Lorentz-E and Lorentz-HF
  - Particle Library Link to Model Materials
  - Recover Does Not Work for Some Lorentz Versions
  - Rays don't reflect off the symmetry plane in the first ODE step
  - Need to destroy magnetic solution when importing B field to get parallel launch
  - Emission Point Display Not Resizing
  - Continuous Colors Lost on Ray Highlighting
  - Can't Position Cursor Between Existing Regions of Advanced ODE
  - Individual Ray Appearance is Easily Lost
  - Unreadable Exponents for B field Components in Test External Field
  - Patchy Coloring per ODE step when Using Velocity Magnitude
  - ODE interval data needs to be deleted when the beam axis changes.

## LORENTZ 2D

- Structured Emitters Should only be in 3D
- Phasor Mode Not Working
- Element method crashes with RK5 and Bulirsch Stoer solvers
- Crash When Starting this Parametric
- Spot Size in Define Outputs in Lorentz2D
- 2D X-Y Switch Doesn't Stick when I save and Re-open this Model
- Space charge not calculated in this model
- Missed Intersection and Termination Boundary
- Crash With Trajectory Solver in this Model
- Script that Causes LORENTZ to Crash Later
- Crash Opening Tubes Model after Elements Model with API
- Advanced Step Control is not working under small scale
- Crash/Hang Defining Voltage Plot
- No Space Charge Iterations when using a Discrete Point Emitter

- Missing Inductance in Lorentz2E
- Rays Crossing RS Axis Randomly

## LORENTZ 3D

- Model crashes in Lorentz 3D development and v930
- Create plots ONLY on visible rays doesn't work
- Stray Rays for Jim model
- Structured Emitters Checkbox
- Structured Grid crashes Lorentz
- Rays running in opposite direction.
- Much Different Results with Standard Multipaction Model
- Coloring by Velocity in this Model
- Markers OnOff crashes when there are no rays
- Field Solver Give Crash in Lorentz-HF but not in Singula
- Cannot launch beam with "Enable Trajectory Boundary" unchecked
- Emitter Doesn't Update when Segment is Moved
- Parametric AVI File Doesn't Appear on the List
- Appearance of Markers is Messed up for Most Options
- Number of rays launched equals number of threads
- Crash Displaying Many Point Rays
- Time Harmonic Quasi Transient Setting in this Model
- Messed Up View When Opening New Models With Section View On
- space charge iteration convergence
- Cannot reset ray selection after selecting all visible rays
- Ray won't get past the symmetry plane
- Kinks in y vs time graph containing lots of intersection
- Ray Passing Through Collector
- Charge Density in Beam Plots
- Units for Density Plot
- Rays That Pass Through Collector at the Pole
- Make Full Model - Crash when solving
- Scale Solution Inactive
- Space Charge and the FEM Solver
- Crash Switching to Tubes
- Model Where Rays Don't Propagate in Latest Lorentz
- Crash With DLL For Wind

- Rays Passing Through Collector
- Geometry Merge Problems with Rapiscan Models
- Lorentz-LF-E not working
- Trouble solving trivial model
- Termination Boundary Problem
- Emission Editing Dialog Problem
- Reported Emission Current 10% too High
- Veeco: Lorentz Contour Plot Interference
- Rebuilding the Matrix when it isn't Needed
- Rapiscan: Secondary Rays Launch in Wrong Direction

## ***NEW API FUNCTIONS***

API functions can be introduced as required by specific users much more readily than functions that affect the interfaces because their influence on the rest of the program is much more limited.

### **Geometry Functions**

- `Geometry_Scale(LPCTSTR sName, DOUBLE xRef, DOUBLE yRef, DOUBLE zRef, DOUBLE xScale, DOUBLE yScale, DOUBLE zScale, SHORT* iErr);`
- `Geometry2D_Scale(LPCTSTR sName, DOUBLE xRef, DOUBLE yRef, DOUBLE xScale, DOUBLE yScale, SHORT* iErr);`

### **Physics**

- `Physics_SetSymmetry(long iSymmX, long iSymmY, long iSymmZ, SHORT* iErr);`

### **LORENTZ**

- `View_SetRaySection_All(SHORT* iErr);`
- `View_SetRayTimeSection(DOUBLE dStartTime, DOUBLE dEndTime, SHORT* iErr);`
- `View_SetRayDistanceSection(DOUBLE dStartDistance, DOUBLE dEndDistance, SHORT* iErr);`
- `Analysis_GetBeamCurrent_BySurface(long aiBeamID, long aiGeomID, DOUBLE *adCurrentVal, SHORT* aiErr);`
- `Analysis_GetBeamCurrent_ByPlane(long aiBeamID, DOUBLE adPlnPtX, DOUBLE adPlnPtY, DOUBLE adPlnPtZ, DOUBLE adPlnNX, DOUBLE adPlnNY, DOUBLE adPlnNZ, DOUBLE *adCurrentVal, SHORT* aiErr);`

## Magnetic

- `Analysis_GetInductanceMatrix(long iDimensions, VARIANT *saInductanceMatrix, SHORT* iErr);`
- `File_SaveCircuitParameters(LPCTSTR sFilePath, SHORT* iErr);`
- `Physics_SetVolumeConductor(LPCTSTR sName, long iConductorNumber, SHORT* iErr);`
- `Physics_SetConductorTotalCurrent(long iConductorNumber, DOUBLE dCurrent, SHORT* iErr);`
- `Analysis_GetFluxLinkage_OnCoil(LPCTSTR sCoilName, DOUBLE* dFluxLinkageRe, DOUBLE* dFluxLinkageIm, SHORT* iErr);`
- `Analysis_GetFluxLinkage_OnWinding(LPCTSTR sWindingName, DOUBLE* dFluxLinkageRe, DOUBLE* dFluxLinkageIm, SHORT* iErr);`

## Electric

- `File_SaveCircuitParameters(LPCTSTR sFilePath, SHORT* iErr);`

## OTHER NEW FEATURES AND IMPROVEMENTS

### Graph Window Mouse-Over Data Point

In the old **AutoGraph** program you could query the value of a data point just by hovering the mouse over it. That was not included in the new graph window, but was included part way through the v9.3 release by popular demand.



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## Improved DXF Import

The DXF file format did not originally include a length unit. As a result, INTEGRATED programs have prompted you for a unit when importing DXF. Since R14 DXF files now contain a unit which INTEGRATED programs will now use during import. When an older format DXF is detected you will no longer be prompted for a unit, but will be informed that the active unit was used. For example, if you are presently working in cm and import an old format DXF, it will be imported with all dimensions in cm.