GRASP9.4.01 RELEASE NOTE

GRASP9.4.01 contains a large number of new features. Most notably, reflector surfaces can now be exported in CAD format and several program modules have been updated with support for multi-CPU and multi-core systems. This release also contains major updates of the Multi GTD and Coupling add-ons as well as several new features in the MoM add-on. Please consult the list of new features below for further details.

Contents:

New features in GRASP9

Base package (all users):

Ticket No.	Description of new feature
98	**CAD output in STEP and IGES format** GRASP9 reflector surfaces can now be exported as CAD files in STEP or IGES format. The precision of the CAD model is user-defined and the reflector can be transformed to a user-defined coordinate system before the export. The reflector will be exported as a single shell with zero thickness. The CAD export facility is accessed through the commands “Export to STEP file” and “Export to IGES file” which are available in the command list window. The CAD export feature will be extended to other scatterer types in future GRASP9 releases.
99	**Number of PO points now unlimited:** The total number of PO integration points on a single face was previously limited to 2^{31}-1. This restriction has been removed.

Ticket No.	Description of new feature
118	**Multiple distortion surfaces in Reflector class:** The attribute “distortion” in the Reflector class can be used to model reflector imperfections. Previously, only a single Surface object could be referenced by the distortion attribute. The attribute now allows multiple Surface references and the attribute has therefore been renamed to “distortions”. Backward compatibility with tor-files containing the “distortion” attribute is maintained.
513	**Feed calculations parallelized:** Multi-core and Multi-CPU support has been implemented in the field calculation of all Feed classes. The user will experience a speedup almost identical to the number of CPU cores when calculating feed fields.
515	**Calculation of Electrical properties:** Multi-core and Multi-CPU support has been implemented in the calculation of reflection and transmission coefficients in all “Electrical Properties” classes.
527	**Tabulated planar source parallelized:** The field calculation in the Tabulated Planar Source class has been parallelized for multi-core or multi-CPU systems.

Multi GTD add-on only:

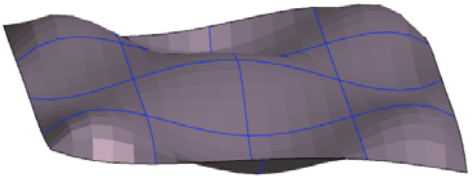
Ticket No.	Description of new feature
	Major update of Multi GTD add-on: The new Multi GTD add-on is an update to the former Multi Reflector GTD add-on with the important feature that plates and circular struts can now be handled. Further, a better ray specification is included. It is thus possible to specify rays to be traced individually or to specify that all rays which are reflected/diffracted, say, three times in the scatterers shall be traced. This constitutes a much more versatile and easy-to-use tool in analysing the different scattering contributions. In addition, the new Multi GTD add-on includes partial support for multi-core and multi-CPU systems.
101	**Speed improvement in GTD calculations:** A rewrite of the GTD code in GRASP has resulted in a factor of 2-4 speedup on a single CPU core when compared to GRASP9.3.03

Coupling add-on only:

Ticket No.	Description of new feature
	Major update of Coupling add-on: The new coupling add-on represents a new and easier way to specify the orientation and movement of two objects relative to each other. It is thus possible to model an azimuth-over-elevation step/scan measurement and determine the coupling between the antenna under test and the measurement probe. The output may further be presented in the grid format. Please consult the Coupling manual for details on the new classes and options.

MoM add-on only:

Ticket No.	Description of new feature
55	**Meshing of very elongated polygonal stiffeners improved:** In previous versions, the “Polygonal Stiffeners” class could not be used to model stiffeners with a very elongated polygonal cross section, e.g., a dielectric rib with a thickness much smaller than the length. The meshing algorithm has now been improved to allow optimal meshing of elongated polygonal stiffeners.
58	**Approximate MoM model for thin dielectric sheets implemented:** An approximate solution for thin dielectric sheets (thickness less than 0.3 wavelengths) is now possible when the scatterer is defined as a “Tabulated Mesh”. The thickness and the permittivity of the dielectric sheet is used to define an equivalent purely imaginary surface impedance which is then written in the mesh file. The formula required for computing the equivalent surface impedance is given in the MoM add-on manual. The memory savings of the approximate model is a factor of 16 when compared to the full MoM solution.

Ticket No.	Description of new feature
78	**"Tabulated Mesh" class now accepts 4th order quads defined by 25 interpolation nodes:** The higher-order MoM solver in GRASP9 uses 1st, 2nd, or 3rd order quads defined by 4, 9, or 16, interpolation nodes. For very accurate modelling of highly curved surface, the MoM solver has now been extended with 4th order quads defined by 25 interpolation nodes. The 4th order quads are only used in user-supplied meshes, i.e., in the "Tabulated Mesh" class. An example of a single 4th-order quad is shown below: 
184	**"Write MoM mesh" now allows specification of the length unit of the output mesh file:** Previously, the "Write MoM Mesh" command would write the mesh file in meters. A new attribute has been added that allows any GRASP9 length unit to be chosen.
284	**New attribute in "Tabulated Mesh Plot" and "MoM Plot":** The two plot classes "tabulated_mesh_plot" and "mom_plot" has been extended with a new attribute "show_iso_lines". This attribute can be used to turn plotting of iso-parametric lines on patches on or off. The default setting is on. The number of iso-parametric lines in each coordinate direction is always p-1 where p is the order of the patch. The iso-parametric lines intersect at the interpolation points used to construct the patch.
745	**Linear equation solver for symmetric matrices parallelized:** The direct linear equation solver for symmetric matrices has now been parallelized and will take advantage of all available CPU cores. This solver is used for PEC structures if the "performance_optim" is set to "memory" or if "performance_optim" is set to "automatic" and the detected memory resources are low.

- **Deprecated and obsolete features in GRASP9:**

Ticket No.	Description of feature
309	**Binary output of cut and grid files is now obsolete:** The "Field Storage" classes used for storing fields in grids or cut files previously contained the attribute "file_form" which could be set to "formatted" (default) or "unformatted_single". Support for the "unformatted_single" format has now been removed and the attribute "file_form" has been deleted. If GRASP9.4.01 reads an older project containing the "file_form" attribute, the warning "foreign attribute" will be issued and the resulting cut or grid file is always written in the default "formatted" format.
572	**Obsolete attributes in "Spherical Wave Expansion (SWE)"** The SWE class is used for computing Spherical Wave Expansions of sources in GRASP9. The two attributes "near_far" and "near_dist" could previously be used to sample the GRASP9 source on a near field sphere instead of the far field sphere (far field was the default). However, this is not particularly meaningful since the resulting SWE will be the same no matter where the field is sampled. The two attributes have therefore been declared obsolete and will be removed in a future update. In the present version, the attributes have been renamed to "obsolete_near_far" and "obsolete_near_dist", and the attributes are still functional.

Bug fixes in GRASP9

Ticket No.	Bug fix description
1	(Windows platform only) **Use of *horizontal* scroll may cause program crash:** The toolkit used for building the graphical user interface for GRASP9 contained an error when the installed mouse driver is provided by Logitech. A Logitech mouse using a standard Windows driver did not trigger the error. Use of the *horizontal* scroll may cause GRASP9 to crash. (Vertical scroll was fixed in a previous update).
10	**Wrong frequency written in header of grid file:** The header of an output grid file contained the string "FREQUENCY: XXX" where XXX was supposed to be the frequency. However, if the frequency is defined by a wavelength object the value of XXX was the wavelength and not the frequency. In addition, if a wavelength or a frequency object contained a sequence with a large number of entries, the string written in the output grid file was truncated. These issued have been corrected.
48	(Windows and Linux platforms only) **No PNG file creation in GRASP9 preprocessor:** In case a pattern cut or a contour plot is generated in the GRASP9 preprocesor (Plot 2D cut, Plot uv-data) and the user wants to create a data file with the plot, only HPGL and CGM worked but not PNG.
106	(Windows and Linux platforms only) **Data files referenced from commands not visible in the navigator pane:** Data files referenced by the commands in the command list window did not appear in the list of data files in the preprocessor navigator pane.
108	(Windows and Linux platforms only) **“Redraw” did not create plot objects automatically:** The redraw feature for OpenGL plots in the GRASP9 preprocessor did not auto-generate plot objects. The user therefore had to open a new OpenGL plot window to see newly defined scatterers.
120	(Windows and Linux platforms only) **The command ”Add OpenGL plot” was not accessible:** The command "Add OpenGL plot" could not be created or edited in the GRASP9 preprocessor.

Ticket No.	Bug fix description
124	**Missing empty parenthesis results in wrong screen output:** If a tci file contains a command with zero arguments, GRASP9 expects an empty parenthesis. If the parenthesis is missing, GRASP9 does not print the correct command name on the screen but only the first letter. This bug is only triggered if the user writes the tci file without using the GUI.
128	(Windows platform only) **Only one processor used by GRASP9 on Windows systems with Opteron processors:** GRASP9 was limited to one CPU on Windows/Opteron systems. This bug was casued by a bug in a vendor-supplied library which has now been updated.
131	**“Invalid before code” when using “Get Reflector Data”:** In rare situations, the command "get reflector_data" could result in the error "Invalid BEFORE code". The error only occurs when the reflector surface output is computed and the first point evaluated by the "get_reflector_data" coinsides with the rim centre. Depending on the sequence of the commands preceeding the "get_reflector_data" command, the error could also result in wrong RMS surface values, and wrong maximum and minimum values.
156	**Error in grid file with np=1:** Field grid files with only one sample point along one or both coordinate directions were not written correctly by GRASP9. In addition, the wrong grid file could not be read by GRASP9.
268	**Missing unit in log file when using “Get Coordinate System”:** The command “Get Coordinate System” did not write the length unit “m” for the coordinates of the origin to the log file.
283	**Indefinite loop and huge log file in batch runs:** If GRASP9 was launched in batch mode from a script and the tci file did not end with the expected QUIT command, GRASP9 would go into an indefinite loop and fill the log file with “GRASP9>” prompts. This error was only triggered if the preprocessor was not used and the user supplied his own tci file and if GRASP9 was launched with no keyboard and output terminal attached. It is now always assumed that the last command in the tci file is QUIT.
528	**Crash in ”Tabulated Planar Source”:** The Tabulated Planar Source class could cause a program crash instead of reporting an "insufficient memory" error. The correct error message is now printed.

Ticket No.	Bug fix description
575	**Error in input of surface file data:** GRASP9 reported an error if a line in a tabulated surface file contained exactly 80 characters. The affected classes were ”Regular xy-Grid” and ”Irregular xy-Grid, Pseudo-Splines”.
607	(SUN OS and Mac OS X platforms only) **Crash during start-up when launched via the PATH environment variable:** GRASP9 could crash during startup if the path of the executable was found via the PATH environment variable. If the full path name was provided, the crash did not occur.
696	**Changes in reference coordinate system not detected in two surface classes:** The two surface classes, Irregular xy-grid, Triangulation and Pseudo-splines, did not discover when the reference coordinate system was changed during the execution. This error is not triggered if the analysis is submitted from the GRASP9 GUI.

Post-processor only:

Ticket No.	Bug fix description
127	**Wrong time stamp in raster display:** When creating a "raster display" in the contour section of the Postprocessor, a time stamp is used in the "header on plot" suggested by the program. In the first raster display made, the time stamp was correct. In subsequent raster displays, the time stamp of the first plot was re-used, meaning that all raster displays got the same time stamp. The time stamp is now updated to the current time for all raster displays.
170	**Crash when number of grid points is too low:** The postprocessor could crash when reading a GRASP9 grid file with only two grid-points along one or both coordinate directions. It is now checked that the number of grid points is at least 4.
174	**"Power/Pol.axis angle" polarisation conversion fails for surface field grids:** If a surface field grid was read by the postprocessor, a polarisation conversion to "Power/Pol.angle" could fail if the field grid contained points with zero or extremely low field values.
240	**Postprocessor crashes when moving window:** The postprocessor could crash at apparently random times when plot windows are moved with the mouse. This has been corrected.
521	**Polarisation coordinate system pointing error:** When defining the pointing of the polarisation-defining coordinate system z-axis by means of Earth longitude-latitude, the pointing was not calculated correctly (Contour plot section).
522	**Polarisation coordinate system pointing option:** In the dialog "Polarisation components" a link to the "Satellite position data list" dialog has been added. This is enabled if the "Pol. coor. pointing in" variable is 'Earth coordinates'.
593	**Postprocessor crash when polygon file names are long:** If a polygon file name with a long path has been specified in the "Coverage files input" dialog, the program crashes when pressing F2, F3 or F4.

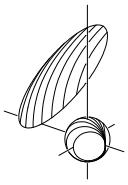
Ticket No.	Bug fix description
700	**Wrong beam indices in contour plot:** By enabling the check box "Beam indices at maximum" in the "Plot options" dialog (contour plot) the beam number is displayed at the beam maximum. These beam indices were not displayed correctly when multiple element beams were displayed.
701	**Problem with deeply nested files in the 3D plot section:** If the full path name to a surface/field data file was longer than 80 characters the 3D visualisation section did not work.
707	**Text strings truncated in raster plot section:** The text strings above and below the raster colour plot could be truncated if the window was maximized.
731	**Excessive number of warnings when polarisation coordinate system is used:** The warning "Polarisation coordinate system used" is now only issued once, both when a pattern cut is input directly by opening the file and when pattern data are input through a project file.

MoM add-on only:

Ticket No.	Bug fix description
119	**Malformed “Currents Colour Plot” file left open by the GRASP9 GUI:** If a malformed currents colour plot file was read by the GUI version of GRASP9, the file would remain open and therefore prevent deletion or updating. The malformed file was not released before the GUI version of GRASP9 exited.
233	**Excessive number of tabulated mesh files could result in an operating system error:** If a large number of tabulated mesh files were used in a single GRASP9 run, e.g, more than 200, GRASP9 could sometimes trigger the operating system error: “Too many open files”. The actual limit on the number of open files is operating system dependant. This issue has been resolved and the number of mesh files in a single GRASP9 run is now practically unlimited.

Known problems in GRASP9

Ticket No.	Bug fix description
129	(Linux platform only:) **GUI crashes on Fedora Core 6:** When the GRASP9 preprocessor for linux is running on Fedora core 6, and potentially other recent Linux distributions, OpenGL plot might fail with the error message "glXMakeCurrent failed". If OpenGL plot is attempted again, the preprocessor crashes.
	(Windows Vista platform only:) **Warning during installation of dongle drivers on Windows Vista:** When GRASP9 is installed on a node-locked license with a USB dongle, Windows Vista might report a potential problem during the final steps of the GRASP9 installation. The warning message is “This program might not have installed correctly” which should simply be ignored by clicking “Program installed correctly”.
771	(Linux amd64 platform only:) **Crash at random times when running on multiple CPUs:** On some networks, it has been observed that GRASP9 for Linux/amd64 may crash at apparently random times when running on more than one CPU. The problem can be resolved by adding the name and IP number of the license server machine to the /etc/hosts file on the machine where GRASP9 is running. The 32-bit versions and the GUI versions are not affected. This error is caused by a bug in the licensing toolkit embedded in GRASP9.



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