List of changes in the program MCNScript

Below is the list of changes for each version of MCNScript that was available for download from http://web.vu.lt/ff/a.poskus/mcnelectron/, up to the current version (1.0.5.3).

1.0.0.1 (2016-08-04)**:**

1. Added the checkbox “Keep track data in memory” in the main window and in the “Track statistics” dialog window (see the updated user manual).

2. Updated the user manual.

1.0.0.2 (2016-08-05)**:**

1. For named materials, both the material identifier and the material name are shown in the grid control “Materials” (previously, only the material name was shown).

2. Shortened the identifier of an empty cell to “V<n>” (previously, it was “Void_<n>”).

3. Updated the user manual.

1.0.0.3 (2016-08-06)**:**

1. Fixed a bug that caused a crash after clicking the button “Start MGED”, if the text box “MGED startup command line” had been cleared of any text.

2. Updated the user manual.

1.0.0.4 (2016-08-07)**:**

1. Added an option to specify the ENDF data folder on the MCNelectron command line, and the corresponding controls in the dialog window “MCNelectron command-line arguments” (this option works only with the MCNelectron executable compiled on 2016-08-07 or later).

2. Several minor improvements of the user interface have been made (for example, the dialog window “About MCNScript” now includes the links to the ZIP archives with electroatomic, photoatomic and atomic relaxation sublibraries of the ENDF/B-VII.1 data library).

3. Fixed a bug that sometimes caused a failure to find the input file for an MCNelectron run if the current folder of the cmd.exe window was not the same folder where the MCNelectron executable file is located.

4. Updated the user manual.

1.0.0.5 (2016-08-08)**:**

1. Added an option to copy the created RT script to clipboard automatically, and the corresponding checkbox in the main window. Be default, this checkbox is not checked (previously, the script was always copied to clipboard, which could cause problems in the case of very large scripts).

2. Updated the user manual.

1.0.0.6 (2016-08-09)**:**

1. Added an option to show the track segments instead of the complete tracks in the MGED Graphics Window, and the corresponding checkbox in the main window.

2. Fixed a bug that caused incorrect track segment selection when one of the criteria for selecting the track segment was the energy loss of the particle.

3. Updated the user manual.

1.0.0.7 (2016-08-10)**:**

1. Modified the "Track statistics" dialog window by adding five rows with the statistics of several quantities corresponding to the initial point of a track segment.

2. Updated the code to take into account the recent change of the MCNelectron track data file format (the updated code works only with the track data files created by the MCNelectron executable compiled on 2016-08-10 or later).

3. Updated the user manual.

1.0.0.8 (2016-08-11)**:**

1. Fixed a bug that caused a failure to create a new MGED database if the database folder was not the same folder where the MCNScript executable file is located.

2. Improved the directory structure of the installation folder of the complete MCNelectron package (MCNelectron and MCNScript): the data files of the sample simulations have been placed in separate subfolders of the "MCNelectron\Simulations" folder, and the PDF files with the documentation have been placed in the subfolder "Docs".

3. Updated the user manual.

1.0.0.9 (2016-08-18)**:**

1. Added an option to limit the number of vertices of the tracks shown in the MGED Graphics Window, and the corresponding controls in the MCNScript main window.

2. Fixed a bug that caused incorrect materials to be skipped in the MGED Graphics Window and in the lingering window when some of the materials defined in the MCNelectron input file were not assigned to any cells.

3. Updated the user manual.

1.0.0.10 (2016-08-19)**:**

1. Increased the speed of raytracing when some of the 3D objects are defined in the MCNelectron input file as intersections of half-spaces (the increase of raytracing performance has been achieved by replacing the half-spaces in the RT script file with sufficiently large right circular cylinders).

2. Updated the user manual.

1.0.0.11 (2016-08-21)**:**

1. The lingering windows created by MGED are now brought to the foreground after clicking “Activate the MGED window”.

2. Fixed a bug that caused the error message “Encountered an improper argument” after the following sequence of actions: 1) start two instances of MGED corresponding to different parameter sets, 2) close the instance of MGED corresponding to the non-current parameter set, 3) select the parameter set corresponding to the closed instance of MGED, 4) select the parameter set corresponding to the active instance of MGED, 5) activate MGED by clicking “Activate the MGED window”, 6) close MGED.

1.0.0.12 (2016-08-22)**:**

Fixed a bug that caused a raytracing failure if the checkbox “Show the wireframe view in the MGED Graphics Window” was not checked.

1.0.0.13 (2016-08-23)**:**

1. Fixed a bug that caused a failure to create the “File Open” dialog windows on Windows XP.

2. Updated the user manual.

1.0.0.14 (2016-08-25)**:**

1. Made it possible to use the button “Activate the MGED window” when the executable file name specified in the text box “MGED startup command line” is not “mged.exe” (one alternative to MGED is Archer, whose executable file “archer.exe” is usually located in the same folder as “mged.exe”).

2. Updated the user manual.

1.0.0.15 (2016-09-01)**:**

1. Calculation of the stopping power (in the bottom row of the track statistics grid control) has been made more accurate. Now, it is calculated only for the track segments with defined values of the initial and final path length (they are defined in the “Track segment selection” grid control of the “Track statistics” dialog window).

2. Corrected calculation of path lengths (and display in the MGED Graphics Window) of track segments defined by limiting the path length of the original track (i.e., when both bounds of the path length are specified in the bottom row of the “Track segment selection” grid control of the “Track statistics” dialog window).

3. Updated the user manual.

1.0.1.0 (2016-09-04)**:**

1. The 64-bit executable “MCNScript_x64.exe” has been added to the distribution packages. The Visual Studio 2010 project has been modified to generate both the 32-bit and the 64-bit executables.

2. The line-continuation character ‘&’ is now recognized in the MCNelectron input files.

1.0.1.1 (2016-09-09)**:**

Corrected the English in the names of several controls in the dialog windows, in the user manual and in the MCNScript parameter file. Because of the latter change, the parameter file became incompatible with the previous versions of MCNScript. In order to be able to open a parameter file corresponding to the previous version of MCNScript, the word “subscript” should be replaced by “suffix” everywhere in the parameter file.

1.0.1.2 (2016-09-14)**:**

1. Fixed a bug that made the “File / Open…” menu command non-functional on Windows XP.

2. Added tooltips to several controls.

1.0.2.0 (2016-11-03)**:**

1. Added the capability to read the track data files produced by MCNelectron v1.2.4 and to display the secondary particle tracks in the MGED Graphics Window (the tracks of secondary particles of different types are drawn in different user-defined colors).

2. Added the capability to filter the tracks by the secondary particle type and the type of the event where those particles were created, as well as by the “generation number” of those particles. 11 types of secondary particles are recognized.

3. In addition to the changes related to inclusion of the secondary particle tracks, several minor improvements of the user interface have been made.

4. Updated the user manual.

1.0.2.1 (2016-11-06)**:**

1. Added the “Stop” button next to the progress bar, allowing to interrupt reading the track data from a file.

2. Fixed a minor bug that could cause the beam axis to be displayed after opening a parameter file when it should not be displayed, i.e., when the parameter file had been saved with “None” selected in the beam axis color dropdown list. In the current version of MCNScript, the selection “None” is represented by the line “beamAxisColor = (-1, -1, -1)” in the parameter file (in the previous version of MCNScript, the RGB color components of the standard Windows dialog color were specified between the parentheses).

1.0.2.2 (2016-11-09)**:**

1. It is no longer possible to modify the track filtering parameters while the track data are being processed.

2. A minor bug related to track filtering (incorrect behavior after modifying the history number in the “Filtering by transport parameters” grid control) has been fixed.

1.0.2.3 (2016-11-15)**:**

1. Fixed a bug that caused “freezing” of MCNScript after an attempt to load a track data file, if the specified track data file did not exist and the checkbox “Keep track data in memory” was not checked.

2. Fixed a bug that caused a crash after clicking on the header of the column with checkboxes in the grid controls with colors of materials and tracks.

3. Several minor improvements of the user interface (mostly in warnings and informational messages) have been made.

1.0.3.0 (2016-11-24)**:**

1. Changed the display of flat surfaces in the wireframe view. In order to avoid drawing of half-spaces (which is in MGED slower than drawing of finite 3D primitives), the set of all flat bounding surfaces of each 3D object is replaced by a polyhedron bounded by those planes. The 3D object is then defined as the intersection of this polyhedron and all other 3D primitives used in the definition of the object. This improves the level of detail in the wireframe view, because the edges of all polyhedra are visible (the raytraced image is not affected). If the mentioned polyhedron is open, then it is "closed" by adding the clipping planes to it (the clipping planes are normal to the coordinate axes).

2. Added an option to adjust the positions of the clipping planes of infinite 3D primitives (i.e., the flat faces of truncated cylinders and cones, and the clipping planes of open polyhedra). Their initial positions are such that they are either beyond the clipping cube, or coincide with the faces of the clipping cube. However, those positions may be iteratively adjusted until each clipping plane touches the surface of the cell containing a given 3D primitive. This adjustment further increases the amount of detail in the wireframe view (the raytraced image is not affected). The adjustment is done in steps, whose length is decreased by half in each iteration. The maximum number of iterations (steps) can be specified in the corresponding text box of the main window.

3. Updated the user manual.

1.0.3.1 (2016-11-26)**:**

The keyword "VOL", which is used in MCNelectron input files for specifying the volume of a cell, is now recognized by MCNScript.

1.0.3.2 (2016-12-04)**:**

1. Fixed a bug that caused a failure to execute the RT script if some of the defined materials were not used in definitions of any cells of the geometry.

2. Fixed a bug that could cause missing 3D objects in the raytraced image when the cut-away plane was used and the option of iterative adjustment of the positions of the clipping planes was selected (a 3D object was absent in the raytraced image when the cut-away plane did not intersect with the final clipping box of that object).

1.0.4.0 (2016-12-13)**:**

1. MCNScript has been made compatible with MCNelectron v1.2.5, which means that MCNScript recognizes macrobodies defined in MCNelectron input files, and formats the wireframe view accordingly.

2. Updated the user manual.

1.0.4.1 (2016-12-15)**:**

Fixed the errors in the construction of two types of standard macrobodies: right hexagonal prism (RHP or HEX) and four-sided polyhedron (ARB4).

1.0.4.2 (2016-12-16)**:**

1. Fixed the errors in the wireframe view and in the raytraced image when some of the bounding surfaces of the 3D objects are non-planar facets of the standard macrobodies "RCC" (right circular cylinder) or "TRC" (truncated right-angle cone), referenced using the detailed format "<macrobody ID>.<facet No>".

2. Fixed a bug that could cause a crash while making the RT script when some of the 3D objects have vertices that are the intersection points of four or more bounding surfaces.

1.0.4.3 (2016-12-18)**:**

1. The sign convention for the identifiers of facets of standard macrobodies in the definitions of cells and general macrobodies has been changed. Now, if the identifier of a facet of a standard macrobody is specified in the definition of a cell (or a general macrobody) with the minus sign, then it means the same region that is used in the definition of the macrobody (i.e., the region intersecting with the inside of the macrobody). Otherwise, it means the complement of that region. [In MCNScript v1.0.4.0–2, the opposite convention was used.] This change has been made in order to maintain compatibility with the current release of MCNelectron, where a similar change has been made.

2. Fixed a bug that caused the indicated number of tracks to become zero if the maximum history number specified in the first row of the "Filtering by transport parameters" grid control was greater than the total number of histories.

3. The maximum numbers of surfaces, cells and materials have been increased by a factor of 5 (as in MCNelectron v1.2.5).

1.0.4.4 (2016-12-20)**:**

The size of the raytraced image in the MGED Graphics Window has been made to coincide with the current size of that window (previously, the size of the raytraced image was fixed at 1002 pixels, which caused misalignment between the raytraced image and the wireframe view if the size of the Graphics Window was different).

1.0.4.5 (2016-12-21)**:**

The memory usage has been decreased by allocating the cell data array dynamically. Now, the cell data array is allocated in 20-element "chunks", so that the number of elements in this array does not exceed the number of cells by more than 19 (previously, the cell data array was static and contained 5000 elements, resulting in more than 700 MB of used memory).

1.0.4.6 (2016-12-24)**:**

Coinciding surfaces are no longer treated as a geometry error. Instead, a warning is displayed, but execution of the program is not interrupted.

1.0.4.7 (2016-12-25)**:**

Fixed a bug that could cause errors when checking if a facet of a polyhedron-type standard macrobody coincides with one of previously-defined planes.

1.0.4.8 (2016-12-31)**:**

Improved the wireframe view when there are geometry errors in the definitions of some of the cells of the geometry (previously, some 3D primitives could be missing in the wireframe view for a cell with geometry errors, if the cell was not defined entirely in terms of standard macrobodies).

1.0.4.9 (2017-01-03)**:**

Fixed a bug that could cause errors when drawing the standard macrobodies of the types RCC and TRC (right circular cylinder and truncated right-angle cone). Previously, the base centers of those objects were assumed to be equal to the corresponding parameters of the facets. However, this would be correct only if the base planes of the macrobody are unique, i.e., do not coincide with any other planes used in the simulation setup. Otherwise, the original facets of the standard macrobodies may be replaced by equivalent previously-

defined surfaces, which may have different values of the mentioned parameters. In order to avoid incorrect results, the base centers and height vectors of RCC and TRC objects are now determined in a more general manner (from the points of intersection of the symmetry axis with the base planes).

1.0.5.0 (2017-02-08)**:**

1. MCNScript has been made compatible with MCNelectron v1.2.6, which means that MCNScript recognizes the input directives related to coordinate transformations. In addition, the current version of MCNScript includes the same compiler/interpreter of MCNEcode as MCNelectron, and MCNScript can also run the user programs embedded in the MCNelectron input file.

2. The messages about the errors in the specification of the simulation setup are now displayed in the temporary console window (instead of the message boxes as in the previous versions of MCNScript). The same window displays the text that is output during execution of the user programs embedded in the MCNelectron input file (for example, by the built-in function "print"). If there are no errors and no text output during the processing of the MCNelectron input file, the mentioned console window will be closed automatically after the processing. It can also be closed manually using the "Console" menu.

3. Several minor improvements of the user interface have been made, several minor bugs have been fixed.

4. Added several parameter sets to the MCNScript parameter file, which demonstrate some of the new capabilities of MCNelectron: coordinate transformations, procedural generation of input directives, and batch simulations (using both MCNelectron and MCNP6).

5. The user manual has been updated.

1.0.5.1 (2017-02-10)**:**

In order to keep MCNScript fully compatible with MCNElectron, two changes have been made, which mirror the most recent changes of MCNelectron v1.2.6:

1. MCNScript now allows defining the *y* direction vector of the auxiliary coordinate system (defined in the "TR" directive) in terms of its azimuth and elevation angles (v1.0.5.0 allowed this only for the *x* direction vector).

2. The built-in compiler/interpreter of the user codes now recognizes the built-in functions "dir" and "dir2".

2017-02-16:
3. A new parameter set demonstrating application of MCNEcode for generation of a random arrangement of a large number of cells has been added to the MCNScript parameter file.

1.0.5.2 (2017-02-18)**:**

1. Corrected the titles of several dialog windows, added tooltips to several controls.

2. Expanded Section 7 of the user manual (about manipulating the wireframe view in the MGED environment).

1.0.5.3 (2017-03-10)**:**

1. Minor improvements have been made in the MCNScript's built-in compiler/interpreter of MCNEcode (this change mirrors the corresponding change in MCNelectron v1.2.6).

2. Corrected the text of several tooltips.

3. Corrected the user manual.