MCTOOLS Description

MODE cf

Usage:

- --mode cf –i InputFile –cf InputCF:
  - To multiply the MCNP cell density by a factor given in an external file. Only the cells listed in the external file are modified. Modified file written in a file named as "InputFile + '[Corrected_Density]'". Log file written in a file named as "InputFile + '[LogFile]'".
  - The InputCF contains all the necessary information which are structured as follow:

Column No.1	Column No.2	Columns > No.2
Cell No.	Correction Factor	Comments
N lines are possible		

  - Tabs or/and spaces can be used.

Limitation:

N/A

Possible improvements:

N/A

MODE rd

Usage:

- --mode rd –i InputFile –factor ReduceFactor:
  - To modify the MCNP cell densities by a given factor by the user. This function is very helpful during the VRT generation to allow an increased increased penetration of the particle in the geometry or for sensibility studies.
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Limitation:

N/A

Possible improvements:

N/A

MODE wrap

Usage:

- --mode wrap [Default]:
  - Standard organization of the cell description which spans within the 80 characters. Surface and card sections are not modified. The cell description is followed by a line containing all the cell cards, hence by the fill card with the rotation (if present) than the in-line comments in the subsequent line (if present). Comments are maintained. All the comments present are collected. The organized file is coded as filename + [WRAP].
  - The cells' information collected are properly reported and resumed in file as filename + [RESUME].
  - The information of each cell is also written in a table format in a log file which can be easily imported in Excel for further analysis. The organized file is coded as filename + [LOG].
- --mode wrap -mod tmp
  - In addition to the default functionality of the default mode, this flag allows modifying the TMP card of cells contained in universes (to remove or to add).
  - The data are provided in an external file named inputTMP which is organized as follow:

Column No.1	Column No.2	Column No.3	Columns > No.3
Universe No.	Temperature [K]	Materials No	Comments
N lines are possible			

  - Tabs or/and spaces can be used.
  - The user can decide to modify only a subset of materials (i.e. list of material in column No.3 separate only by ",") or all (i.e. "-"). Three examples are reported hereinafter. In the first line, the user is imposing a TMP card corresponding to 160K to all the cells contained in universe 105. In the second line, the user is imposing a TMP card corresponding to 422K only to the cells contained in universe 22 which are assigned to material m300 and m377. In the last line, the user is removing the TMP card from all the cell contained in u=100.

```
105 160     -        # Comments here
22  422 300,377      # Comments here
100  -   -           # Comments here
```

  - If multiple lines refer to the same universe, all the conditions are implemented sequentially. Therefore, this functionality can be used to perform operations. In the following example, the first line imposes the TMP corresponding to 160K to all the cells contained in universe 105. On the hand, the second line fixes the temperature of 422K only to the cell contained in universe 105 which are assigned to material m300 and m377. Therefore, the universe 105 derived will have a temperature equal to 160K apart from the cells with m300 and m377 which will have a TMP corresponding to 422K.

```
105 160     -        # Comments here
105 422 300,377      # Comments here
```

  - MOD string is appended to the output filenames to distinguish the modification of the model content.

- --mode wrap -mod dens
  - In addition to the default functionality of the default mode, this flag allows modifying the cells' density contained in the universe by the multiplication a factor provided by the user.
  - The data are provided in an external file named inputDENS which is organized as follow:

Column No.1	Column No.2	Column No.3	Columns > No.3
Universe No.	Materials No	Density factor	Comments
N lines are possible			

  - Tabs or/and spaces can be used.
  - Both atomic density and mass density can be modified.
  - The user can decide to modify only a subset of materials (i.e. list of material in column No.2 separate only by ",") or all (i.e. "-"). Two examples are reported hereinafter. In the first line, the user is imposing a reduction of 80% in all the cells contained in universe 200. In the second line, the user is imposing a reduction of 60% of cell density only to the cells contained in universe 105 which are assigned to material m300 and m377.

```
200 -         0.80    # Comments here
105 300,377 0.60    # Comments here
```

  - If multiple lines refer to the same universe, all the conditions are implemented sequentially. Therefore, this functionality can be used to perform operations. the user is imposing a reduction of 80% in all the cells contained in universe 105. On the hand, the user is imposing a reduction of 60% of cell density only to the cells contained in universe 105 which are assigned to material m300 and m377. Therefore, the universe 105 derived will have densities reduced by 80% apart from the cells with m300 and m377 which will have a 60% reduction.

```
105 -         0.80    # Comments here
105 300,377 0.60    # Comments here
```

  - MOD string is appended to the output filenames to distinguish the modification of the model content.

- --mode wrap -mod tmp_dens
  - It is the combination of the –mod dens and –mod tmp. Both modifications are executed in the same time.

Limitation:

- only imp, fill, u cards are detected in the line. Further extensions to TRCL card can be easily implemented.
- imp card in the format of imp:n, p, e or in the the material sections are not recognized.
- line comments between within the cell description are not maintained in the same position as the cell is written as a whole.
- The python routine does not check the correct implementation of the MCNP cell description and of the model correctness itself.

Possible improvements:

- Application of TMP to cell not belonging to a specific the universes.