

MEIFI – Introduction and Tutorial

17.10.2025 | Daniil Ryndyk

*SLAB MODEL FOR TEST OF X-GRID: ENERGY BALANCE

* T=0.5 EV, N=5.E13

*** 1. Data for operating mode

0	2	3500	0	1	0	1	0
0	1	1	1	0	9	0	0

TFFT FFFF TFFF FFFF

*** 2. Data for Stand

2	1	1
---	---	---

T

FFFF FFT

-1	1	0	0
----	---	---	---

E

FFF

1	1	0	0
---	---	---	---

0.0000E+00 1.0000E+00

E

TFF

1	0	1	0
---	---	---	---

0.0000E+00 0.0000E+00 1.0000E+00 0.0000E+00 0.0000E+00

E

E

*** 3A. Data for "Non-default Standard Surfaces"

6

* SURFACE No. 1 Periodic

1	1	1	1	1	1	2	1	2
4	2	0	0	0	3	0	0	0
2	0	0	0					

NLSPCSCL

extend volume averaged and surface averaged tallies for species specific rescaling, execute species specific scoring for the respective tallies and calculate refined scaling factors

Learning how to work with EIRENE...

Standard format EIRENE input file

```
*SLAB MODEL FOR TEST OF X-GRID: ENERGY BALANCE
*T=0.5 EV, N=5.E13
*** 1. DATA FOR OPERATING MODE
      0      2  3500 00000      0      0
      0      1      1      1      0      9      0      0
TFFT FFFF TFFF
*** 2. DATA FOR STANDARD MESH
      2      1      1      1
T
FFFF FFT
      -1      1      0      0      0      0 99000
F
FFF
      1      1
      0.0000E 00 1.0000E 02 1.0000E 02
F
TFF
      1      0      1
      0.0000E 00 0.0000E 00 1.0000E 00
F
      1
F
      0
*** 3A. DATA FOR NON-DEFAULT STANDARD SURFACES
      6
* SURFACE No. 1 Periodic
      1      1      1
      4      2      0      0      0      3
* SURFACE No. 2 REFLECTING (WALL)
```

EIRENE manual

The Input Block

TXTRUN

*** 1. Data for operating mode

first card: integer flags controlling global options for the entire run.

NPRL NMODE NTCPU NFILE NITER0 NITER NTIME0 NTIME

next input line is only for EIRENE₂₀₀₂ and younger, and optional in these versions. Defaults, if this card is not included, are given below.

NOPTIM NOPTM1 NGEOMUSR NCOUP.INPUT NSMSTRA NSTORAM
. NGSTAL NRTAL NREAC.ADD

next line (second mandatory line): logical flags for global options [format: 12(5L1,1X)].

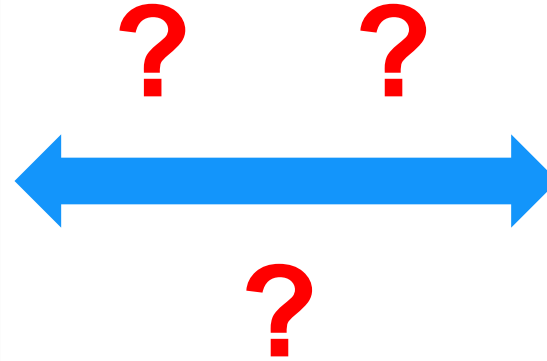
NLSCL NLTEST NLANA NLDRT NLCRR
. NLERG NLIDENT NLONE NLMOVIE NLDFST
. NLOLDNAN NLCASCAD NLOCTREE NLWRMSH NEXVS
. NLTRIMESH NLSPCSCL NLSPCSCL.ON NLSOEDGE

This line was changed in EIRENE tag MsV-2023Mar-PBoernerUnified-beta to

NLSCL NLTEST NLANA NLDRT NLCRR
. NLERG NLIDENT NLONE NLMOVIE NLDFST
. NLRANMAR NLCASCAD NLOCTREE NLWRMSH NEXVS
. NLTRIMESH NLSPCSCL NLSPCSCL.ON NLSOEDGE

Next input lines are only for EIRENE₂₀₀₅ and younger, and optional in these versions. There can be any number of these cards starting with character string *CFILE* in the input file.

"CFILE" DBHANDLE DBFNAME



MEIFI – Make Eirene Input File Interactive

- Tool to visualize the connection between input values in the standard format EIRENE input file and corresponding parameters
- Python based, no special packages required
- Very fast (~ 10 s)
- Coupled to the official EIRENE manual
→ Changes are automatically taken into account
- **BUT:** „Up to date“ EIRENE version which can process json input format required

Useful side effects:

- Identify unused inherited parameters
- Check default settings

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*** 1. Data for operating mode

0 2 3500 0 1 0 1 0
0 1 1 1 0 9 0 0 0

TFFT FFFF TFFF FFFF

*** 2. Data for Stand

2 1 1

T

FFFF FFT

-1 1 0 0

E

FFF

1 1 0 0

0.0000E+00 1.0000E+00

E

TFF

1 0 1 0

0.0000E+00 0.0000E+00 1.0000E+00 0.0000E+00 0.0000E+00

E

E

*** 3A. Data for "Non-default Standard Surfaces"

6

* SURFACE No. 1 Periodic

1 1 1 1 1 1 2 1 2
4 2 0 0 0 3 0 0 0
2 0 0 0

NLSPCSCL

extend volume averaged and surface averaged tallies for species specific rescaling, execute species specific scoring for the respective tallies and calculate refined scaling factors

Tutorial

- ▶ **MEIFI - Tutorial Part 1: Downloading the source code**
- ▶ **MEIFI - Tutorial Part 2: Configuring the run script meifi.sh**
- ▶ **MEIFI - Tutorial Part 3: Markdown language and editors**
- ▶ **MEIFI - Tutorial Part 4: MEIFI-file will definitely look different!**
- ▶ **Unresolved issues and work in progress**

MEIFI - Tutorial Part 1: Downloading the source code

1. Clone EIRENE – branch "DanRyn/ADD_MEIFI_tool" via
git clone -b DanRyn/Add_MEIFI_tool --single-branch <https://jugit.fz-juelich.de/eirene/eirene.git>
2. In the cloned directory, go to "Manual" → "PyMEIFI"
3. There are 5 Python files and 1 shell script:
 - extract_eirene_parameter.py → Generate Markdown files with definition for every parameter
 - make_eirene_template.py → Extract general input file structure from manual .tex files
 - evaluate_do.py → Evaluate Fortran syntax DO loops in the template
 - evaluate_if.py → Evaluate Fortran syntax IF loops in the template
 - generate_input_file.py → Fill in template with values from .json input file
 - meifi.sh → Run script to generate interactive EIRENE input file

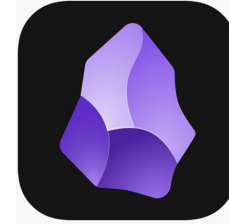
MEIFI - Tutorial Part 2: Configuring the run script meifi.sh

1. Set `manual_dir` → where are the **manual .tex files**?
2. Set `input_dir` → where is the EIRENE input file in the **standard format**?
3. Set `json_input` → where is the EIRENE input file in the **json format**?
4. Set `json_physics_model` → where is the physics model information (Block 4) in the **json format**?
5. Set `parameter_dir` → where should the markdown files with the **parameter definition** be stored?
6. Set `result_dir` → where should the **resulting interactive input file** be stored?

MEIFI - Tutorial Part 3: Markdown language and editor(s)

My choice: **Obsidian**

- Note editor with file linking compatibility
- Free of charge without cloud option (stored locally)
- Runs on different OS



Syntax

- `[[filename|text]]` → Link to a .md file with the name „filename“ which appears as „text“ in the source file
- CTRL + Mouse pointer → Preview of the linked file content
- CTRL + Mouse left click → Open linked file in another window
- Important: use „Editing view“ for correct formatting

MEIFI - Tutorial Part 4: Comparison with original input file

- Interactive file will definitely have more numbers! All the default values from the json input are included
- Check for missing numbers, flags, names,...
- Different numbers can be bugs OR mismatch between json input and standard input (e.g. ID1M/NUMSEC)

Unresolved issues and work in progress

Compatibility problems with different EIRENE versions

- MEIFI was developed based on EIRENE input file structure for EMC3-EIRENE cases
- Tests with EDGE2D-EIRENE cases show that some input lines aren't „translated“

Work in progress

- Parameter name mismatches between json input and manual → Missing numbers in the interactive input file
- „Structural exceptions“ in the manual → Occasionally, parts of parameter definition are ignored
- LaTeX math text rendering problems
- Currently, combination of json inputs „by hand“ is necessary