

# Example DIP documentation

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# Introduction

In this document we want to demonstrate basic capabilities of a DIP documentation.

The documentation is structured into 3 main sections. The first section summarizes all parameters in a DIP code, as well as their corresponding node definitions, declarations, modifications and corresponding properties. Following section summarizes all references of injected values and lists imported nodes. The final section gives an overview of custom units and code sources.

Parameters, nodes, sections and many other items in this documentation are cross-linked between each other. All hyperlinks are denoted with a blue text.

# Parameters

## Node types

|  |                            |  |           |
|--|----------------------------|--|-----------|
|  | Declaration                |  | Injection |
|  | Definition                 |  | Import    |
|  | Declaration / Modification |  |           |
|  | Definition / Modification  |  |           |
|  | Modification               |  |           |

## Parameter list

| Property name                         | # | # | # | # | # | # | # |
|---------------------------------------|---|---|---|---|---|---|---|
| <a href="#">box.geometry</a>          |   | 1 |   |   |   | 1 |   |
| <a href="#">box.size.vy</a>           |   | 1 |   |   |   |   |   |
| <a href="#">box.size.x</a>            | 1 |   |   |   | 1 |   | 1 |
| <a href="#">box.size.y</a>            | 1 | 1 |   | 1 |   |   | 1 |
| <a href="#">box.size.z</a>            |   | 1 |   |   |   |   |   |
| <a href="#">cells.densities</a>       |   | 1 |   |   |   |   | 1 |
| <a href="#">cells.sizes</a>           |   | 1 |   |   |   |   | 1 |
| <a href="#">cells.temperatures</a>    |   | 1 |   |   |   |   | 1 |
| <a href="#">cfl_factor</a>            |   | 1 |   |   |   |   |   |
| <a href="#">max_vare</a>              |   | 1 |   |   |   |   |   |
| <a href="#">max_vari</a>              |   | 1 |   |   |   |   |   |
| <a href="#">modules.heating</a>       | 1 |   |   |   | 1 |   | 1 |
| <a href="#">modules.hydrodynamics</a> |   | 1 |   |   |   |   |   |
| <a href="#">modules.radiation</a>     | 1 |   |   |   | 1 |   | 1 |
| <a href="#">runtime.t_max</a>         | 1 |   |   |   | 1 |   | 1 |
| <a href="#">runtime.timestep</a>      | 1 |   |   |   | 1 |   | 1 |
| <a href="#">simulation.directory</a>  | 1 |   |   |   |   | 1 |   |
| <a href="#">simulation.name</a>       |   | 1 |   |   |   |   |   |
| <a href="#">simulation.precision</a>  |   | 1 |   |   |   |   |   |

## Parameter nodes

### box.geometry

|                         |                       |        |
|-------------------------|-----------------------|--------|
| PDF_FILE1:20   injected |                       | uint16 |
| Value:                  | 3                     |        |
| Options:                | 1, 2, 3               |        |
| Description:            | Type of grid geometry |        |

### box.size.vy

|              |        |         |
|--------------|--------|---------|
| PDF_FILE1:38 |        | float64 |
| Value:       | 23.000 |         |
| Unit:        | km/s   |         |

### box.size.x

|                       |                         |          |
|-----------------------|-------------------------|----------|
| PDF_FILE1:27          |                         | float128 |
| Unit:                 | cm                      |          |
| Condition:            | {?} > 0                 |          |
| Description:          | Box size in X direction |          |
| settings:8   imported |                         | mod      |
| Value:                | 10                      |          |
| Unit:                 | nm                      |          |

### box.size.y

|                       |                         |         |
|-----------------------|-------------------------|---------|
| PDF_FILE1:32          |                         | float64 |
| Unit:                 | cm                      |         |
| Options:              | 3.0 cm, 4.0 cm          |         |
| Description:          | Box size in Y direction |         |
| PDF_FILE1:37          |                         | float64 |
| Value:                | 34.000                  |         |
| Unit:                 | au                      |         |
| settings:9   imported |                         | mod     |
| Value:                | 3e7                     |         |
| Unit:                 | nm                      |         |

### box.size.z

|              |                                   |                  |
|--------------|-----------------------------------|------------------|
| PDF_FILE1:43 |                                   | constant float64 |
| Value:       | 23.000                            |                  |
| Unit:        | cm                                |                  |
| Options:     | 10.0 m, 20.0 cm, 23.0 cm, 26.0 cm |                  |
| Description: | Box size in Z direction           |                  |

### cells.densities

|                    |  |         |
|--------------------|--|---------|
| cells:1   imported |  | float64 |
| Value:             | [0.0, 1.0, 2.0, 3.0, 4.0, 5.0, 6.0, 7.0, 8.0, 9.0] |         |
| Unit:              | km/s   |         |

### cells.sizes

|                    |  |       |
|--------------------|--|-------|
| cells:2   imported |  | int32 |
| Value:             | [10, 11, 12, 13, 14, 15, 16, 17, 18, 19] |       |
| Unit:              | cm                                       |       |

### cells.temperatures

|                    |  |         |
|--------------------|--|---------|
| cells:3   imported |  | float64 |
| Value:             | [20.0, 21.0, 22.0, 23.0, 24.0, 25.0, 26.0, 27.0, 28.0, 29.0] |         |
| Unit:              | K  |         |

### cfl\_factor

|               |       |         |
|---------------|-------|---------|
| PDF_STRING1:4 |       | float64 |
| Value:        | 0.700 |         |

### max\_vare

|               |       |         |
|---------------|-------|---------|
| PDF_STRING1:5 |       | float64 |
| Value:        | 0.200 |         |

### max\_vari

|               |       |         |
|---------------|-------|---------|
| PDF_STRING1:6 |       | float64 |
| Value:        | 0.200 |         |

### modules.heating

|                        |                          |      |
|------------------------|--------------------------|------|
| PDF_FILE1:57           |                          | bool |
| Tags:                  | preprocessor             |      |
| Description:           | Switch on heating module |      |
| settings:12   imported |                          | mod  |
| Value:                 | false                    |      |

### modules.hydrodynamics

|              |                                |      |
|--------------|--------------------------------|------|
| PDF_FILE1:54 |                                | bool |
| Value:       | true                           |      |
| Tags:        | preprocessor                   |      |
| Description: | Switch on hydrodynamics module |      |

### modules.radiation

|              |  |      |
|--------------|--|------|
| PDF_FILE1:60 |  | bool |
|--------------|--|------|

|  |                            |
|--|----------------------------|
| Tags:                                      | preprocessor               |
| Description:                               | Switch on radiation module |
| <a href="#">settings:13   imported</a> mod |                            |
| Value:                                     | true                       |

#### runtime.t\_max

|   |                         |
|---|-------------------------|
| <a href="#">PDF_FILE1:11</a> float64      |                         |
| Unit:                                     | s                       |
| Condition:                                | {?} > 0                 |
| Description:                              | Maximum simulation time |
| <a href="#">settings:2   imported</a> mod |                         |
| Value:                                    | 10                      |
| Unit:                                     | ns                      |

#### runtime.timestep

|   |                                   |
|---|-----------------------------------|
| <a href="#">PDF_FILE1:14</a> float64      |                                   |
| Unit:                                     | s                                 |
| Condition:                                | {?} < {?runtime.t_max} && {?} > 0 |
| Description:                              | Simulation time step              |
| <a href="#">settings:3   imported</a> mod |                                   |
| Value:                                    | 0.01                              |
| Unit:                                     | ns                                |

#### simulation.directory

|  |  |
|--|--|
| <a href="#">PDF_FILE1:8   injected</a> mod |  |
|--|--|

#### simulation.name

|                                 |             |
|---------------------------------|-------------|
| <a href="#">PDF_FILE1:4</a> str |             |
| Value:                          | simulation  |
| Format:                         | [a-zA-Z_-]+ |

#### simulation.precision

|                                 |               |
|---------------------------------|---------------|
| <a href="#">PDF_FILE1:6</a> str |               |
| Value:                          | double        |
| Options:                        | double, float |

# References

## Injected values

|                 |                              |
|-----------------|------------------------------|
| PDF_FILE1:8     |                              |
| Injecting node: | simulation.directory         |
| Request:        | {pahts?simulation.directory} |
| PDF_FILE1:20    |                              |
| Injecting node: | box.geometry                 |
| Request:        | {settings?box.geometry}      |
| From source:    | settings:6                   |
| Value:          | 3                            |

## Imported nodes

|                  |                      |              |
|------------------|----------------------|--------------|
| PDF_FILE1:17     |                      |              |
| Request:         | {settings?runtime.*} |              |
| Imported node:   |                      | From source: |
| runtime.t_max    |                      | settings:2   |
| runtime.timestep |                      | settings:3   |

|                |                       |              |
|----------------|-----------------------|--------------|
| PDF_FILE1:49   |                       |              |
| Request:       | {settings?box.size.*} |              |
| Imported node: |                       | From source: |
| box.size.x     |                       | settings:8   |
| box.size.y     |                       | settings:9   |

|              |                          |  |
|--------------|--------------------------|--|
| PDF_FILE1:51 |                          |  |
| Request:     | {options?box.boundary.*} |  |

|                   |                      |              |
|-------------------|----------------------|--------------|
| PDF_FILE1:64      |                      |              |
| Request:          | {settings?modules.*} |              |
| Imported node:    |                      | From source: |
| modules.heating   |                      | settings:12  |
| modules.radiation |                      | settings:13  |

|                    |           |              |
|--------------------|-----------|--------------|
| PDF_FILE1:67       |           |              |
| Request:           | {cells?*} |              |
| Imported node:     |           | From source: |
| cells.densities    |           | cells:1      |
| cells.sizes        |           | cells:2      |
| cells.temperatures |           | cells:3      |



# Settings

## List of units

| Name       | Value | Units | Source                        |
|------------|-------|-------|-------------------------------|
| [velocity] | 13    | cm/s  | <a href="#">PDF_ROOT:25</a>   |
| [length]   | 1     | cm    | <a href="#">PDF_STRING1:1</a> |
| [mass]     | 2     | g     | <a href="#">PDF_STRING1:2</a> |

## List of sources

| PDF_ROOT   |                             |
|--|-----------------------------|
| File:  | build_export_docs.py        |
| PDF_STRING1  |                             |
| File:  | build_export_docs.py        |
| Source:  | <a href="#">PDF_ROOT:26</a> |
| <pre>1      \$unit length = 1 cm 2      \$unit mass = 2 g 3 4      cfl_factor float = 0.7 # Courant-Friedrichs-Lewy condition 5      max_vare float = 0.2  # maximum energy change of electrons 6      max_vari float = 0.2  # maximum energy change of ions</pre>   |                             |
| PDF_FILE1  |                             |
| File:  | definitions.dip             |
| Source:  | <a href="#">PDF_ROOT:35</a> |
| <pre>1  \$source settings = settings.dip 2 3  simulation 4      name str = "simulation" 5      !format "[a-zA-Z_-]+" 6      precision str = "double" 7      !options ["double","float"] 8      directory = {pahts?simulation.directory} 9 10 runtime 11     t_max float s # mandatory 12     !condition ("{?} &gt; 0") 13     !description "Maximum simulation time" 14     timestep float s 15     !condition ("{?} &lt; {?runtime.t_max} &amp;&amp; {?} &gt; 0") # mandatory 16     !description "Simulation time step" 17     {settings?runtime.*} 18 19 box 20     geometry uint16 = {settings?box.geometry} # mandatory 21     = 1 # linear 22     = 2 # cylindrical 23     = 3 # spherical 24     !description "Type of grid geometry" 25 26 size 27     x float128 cm # mandatory 28     !condition ("{?} &gt; 0") 29     !description "Box size in X direction" 30     #y float cm # first declared here 31     @case ("{?box.geometry} == 2") 32         y float cm # mandatory if geometry is non-linear 33         = 3 cm 34         = 4 cm 35         !description "Box size in Y direction" 36     @case ("{?box.geometry} == 3") 37         y float = 34 au 38         vy float = 23 km/s 39     #@else 40     # y float = 3 m 41     @end 42     @case ("{?box.geometry} == 3") 43         z float = 23 cm # constant 44         = 10 m 45         !options [20,23,26] cm 46         !description "Box size in Z direction"</pre> |                             |

```

47         !constant
48     @end
49     {settings?box.size.*}
50     boundary
51     {options?box.boundary.*}
52
53     modules
54         hydrodynamics bool = true # optional
55         !description "Switch on hydrodynamics module"
56         !tags ["preprocessor"]
57         heating bool # mandatory
58         !description "Switch on heating module"
59         !tags ["preprocessor"]
60         radiation bool # mandatory
61         !description "Switch on radiation module"
62         !tags ["preprocessor"]
63
64     {settings?modules.*}
65
66     cells
67     {cells?*}

```

## cells

|         |                             |
|---------|-----------------------------|
| File:   | cells.dip                   |
| Source: | <a href="#">PDF_ROOT:34</a> |

```

1     densities float[10] = [0,1,2,3,4,5,6,7,8,9] km/s
2     sizes int[10] = [10,11,12,13,14,15,16,17,18,19] cm
3     temperatures float[10] = [20,21,22,23,24,25,26,27,28,29] K

```

## settings

|         |                             |
|---------|-----------------------------|
| File:   | settings.dip                |
| Source: | <a href="#">PDF_FILE1:1</a> |

```

1     runtime
2         t_max = 10 ns
3         timestep = 0.01 ns
4
5     box
6         geometry = 3
7         size
8             x = 10 nm
9             y = 3e7 nm
10
11     modules
12         heating = false
13         radiation = true

```