

Tile set and tiling designer

User manual

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1 Executing

`tiling <  $\ell$  > <  $n_x^t$  > <  $n_y^t$  > <  $n^t$  > <  $n_x^c$  > <  $n_y^c$  > <  $f_1$  > <  $f_2$  > <  $file$  >`
`tiling -help`

2 Program parameters

@ ℓ	length of tile edge	Sec. 2.1
@ n_x^t	number of tiles of the tiling in x-direction	Sec. 2.2
@ n_y^t	number of tiles of the tiling in y-direction	Sec. 2.3
@ n^t	number of different tiles in the set	Sec. 2.4
@ n_x^c	number of edge codes on vertical edges (East/West)	Sec. 2.5
@ n_y^c	number of edge codes on horizontal edges (North/South)	Sec. 2.6
@ f_1	flag: type of tiling: <code>_PERIODIC_</code> or <code>_APERIODIC_</code>	Sec. 2.7
@ f_2	flag: range of tile set codes: <code>_MATCHED_</code> or <code>_UNMATCHED_</code>	Sec. 2.8
@ $file$	file with user defined set: “file_name” or “none”	Sec. 2.9
@ $help$	lists the options	Sec. 2.10

Table 1: Input parameter options

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2.1 @ ℓ

type: float

This parameter denotes the actual length of each tile in the set. In other words it is the equidistant dimension of the regular grid of final tiling. Parameter should admit an arbitrary value. Most often, $\ell = 1$.

2.2 @ n_x^t

type: integer

Parameter n_x^t denotes the number of tiles to be placed into the tiled plane in x -direction. It can admit arbitrary **integer** value.

2.3 @ n_y^t

type: integer

Parameter n_y^t denotes the number of tiles to be placed into the tiled plane in y -direction. It can admit arbitrary **integer** value.

2.4 @ n^t

type: integer

Parameter n^t denotes the number of tiles in the set. Its value can not be chosen arbitrarily as it depends on the diversity of the edge codes (following parameters n_x^c and n_y^c). In particular, the number of tiles of the set must be from the interval $\langle k\sqrt{n_{cs}^t}, n_{cs}^t \rangle$ where

$$n_{cs}^t = (n_x^c \cdot n_y^c)^2 \quad (1)$$

and the parameter k must comply with the following inequality $2 \leq k \leq \sqrt{n_{cs}^t}$.

2.5 @ n_x^c

type: integer

Parameter $n_x^c = 0$ denotes number of edge codes assigned to vertical edges and which evolve in x -direction (horizontal direction) when tiling performed. It can admit arbitrary **integer** value.

2.6 @ n_y^c

type: integer

Parameter n_y^c denotes number of edge codes assigned to horizontal edges and which evolve in y -direction (vertical direction) when tiling performed. It can admit arbitrary **integer** value.

2.7 @ f_1

type: unsigned

This parameter admits two predefined values, `_PERIODIC_` or `_APERIODIC_`. While the first one forces the program to produce periodic tilings (simply places the tile set in the row-by-row periodic manner), the second parameter causes the aperiodic tilings. This option is currently used for debugging purposes exclusively and will be removed in release versions.

2.8 @ f_2

type: unsigned

This parameter admits two predefined values, `_MATCHED_` or `_UNMATCHED_`. The first one means that the edge codes for both, vertical and horizontal edges will start with the same value so as to produce the same sequence of codes. However, both sequences might have different lengths due to different values of n_x^c and n_y^c entered. The latter parameter causes the sequence of either vertical or horizontal codes starts where the previously indexed one terminates. Thus, it can never happen, the vertical and horizontal edges share a single code.

2.9 @file

type: string

Parameter `file` denotes the name of a text file with user defined set structure. The possible values it can admit are either “file_name” or “none”. An example of the file structure for the set due to Cohen et al. [1] set W08/2-2 is as follows, Tab. (2). Noting that the horizontal codes for `_UNMATCHED_` sets go first, i.e. $n_x^c = 0, \dots$ starts with zero! Each line contains one tile with codes entered clockwise and starting from South.

2.10 @help

Parameter `help` lists a very abbreviated form of this manual.

No. tile	n_y^{south}	n_x^{west}	n_y^{north}	n_x^{east}
0	2	0	3	1
1	2	0	2	0
2	3	1	3	1
3	3	1	2	0
4	2	1	3	0
5	2	1	2	1
6	3	0	3	0
7	3	0	2	1

Table 2: Example of input file containing Cohen’s W08/2-2 tile set.

3 Generated files

The code provides with four ASCII files after executed:

tileSetDesigner_set_structure.txt Contains the structure of the set defined by the user and the alternative complete set created for maximum number of tiles possible according Eq. (1). A few additional information is included.

tiling_quad_cells.vtk Is the VTK file for visualization purposes in Paraview or Mayavi visualization toolkits. Each tile is represented by a uniformly colored square.

tiling_tri_cells.vtk Is the VTK file for visualization purposes in Paraview or Mayavi visualization toolkits. Each tile is represented by four triangles of different color (in, say, “Wang setting”).

valid_tiling.mtx This file contains the raw list of tile numbers from the set aligned as in the tiled domain.

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References

- [1] M. Cohen, J. Shade, S. Hiller, and O. Deussen, “Wang tiles for image and texture generation,” ACM Transactions on Graphics, vol. 22, no. 3, pp. 287–294, 2003.