

# Supplement to “Artistic Rendering of Curves via Lattice Paths”

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## The Lattices

Figure 1 illustrates the three (cubic<sup>1</sup>) lattices used in the tool, where we have placed each lattice point at the center of a cube:

- Simple Cubic (SC), also known as Primitive Cubic: edges pass through the centers of the cube’s faces
- Face-Centered Cubic (FCC): edges pass through the centers of the cubes’s edges
- Body-Centered Cubic (BCC): edges pass through the cube’s vertices

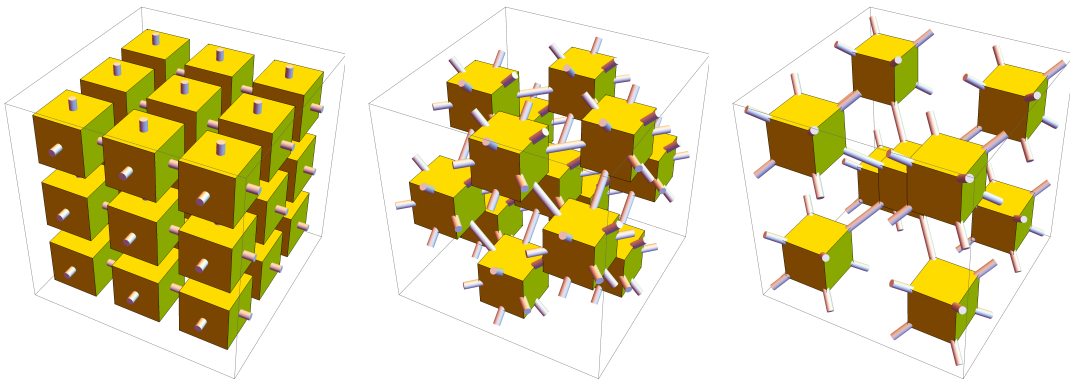


Figure 1: Lattices used in the tool: Simple Cubic (left), Face-Centered Cubic (middle), Body-Centered Cubic (right)

Note that our curve transformation constrains the reshaped male curve to (1) pass through the lattice points and (2) follow the lattice edges.

<sup>1</sup>Other lattices are in principle also possible, but currently not implemented.

## More example curves

More examples of resulting curves are shown in Figure 2.

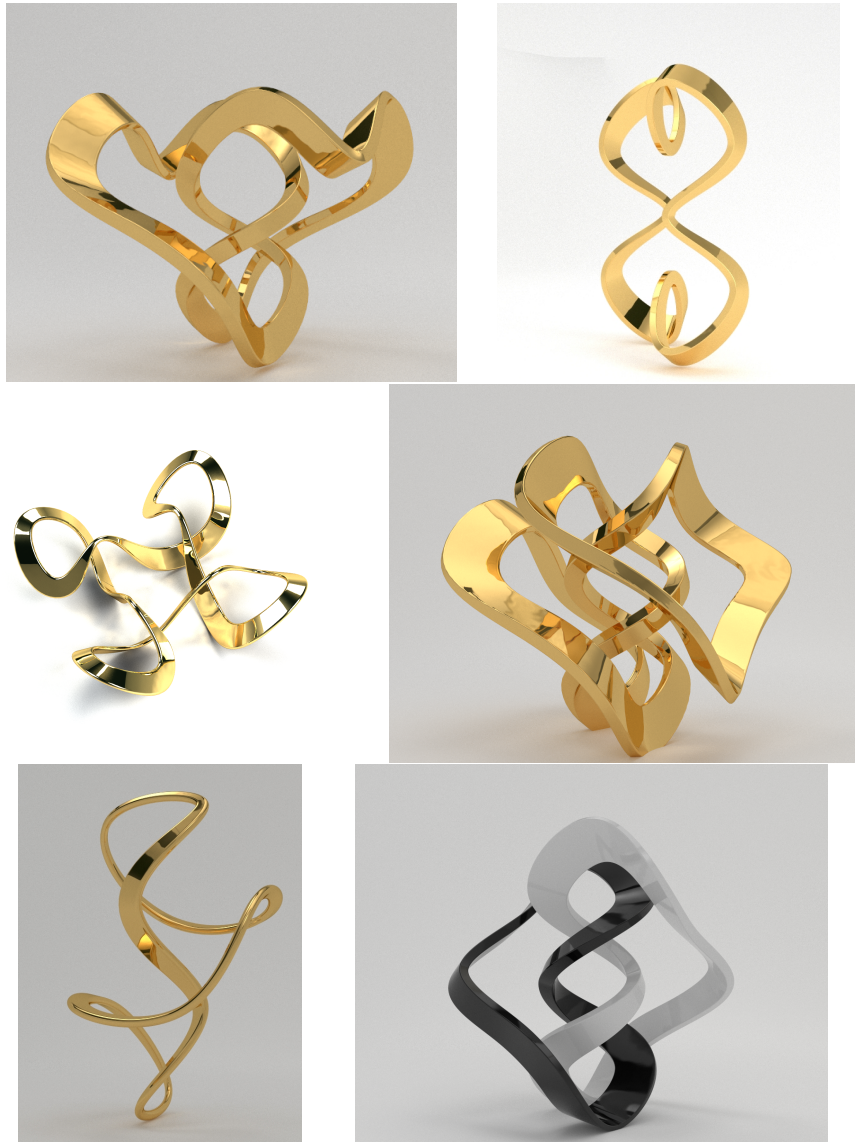


Figure 2: More examples of curves produced with the tool

## Videos

Here are some links to videos on YouTube that allow a better appreciation of the 3D nature of the created curves:

1. [www.youtube.com/watch?v=yFFzAKl6my8](http://www.youtube.com/watch?v=yFFzAKl6my8)
2. [www.youtube.com/watch?v=Llg7s8P1HNA](http://www.youtube.com/watch?v=Llg7s8P1HNA)
3. [www.youtube.com/watch?v=TBdCQ-4VjTE](http://www.youtube.com/watch?v=TBdCQ-4VjTE)
4. [www.youtube.com/watch?v=PfGPw0aHsYc](http://www.youtube.com/watch?v=PfGPw0aHsYc)
5. [www.youtube.com/watch?v=t4Z1q52TgoA](http://www.youtube.com/watch?v=t4Z1q52TgoA)

Additional references to artwork by Koos Verhoeff: [1, 2, 3, 4, 5, 6, 7].

## References

- [1] Tom Verhoeff. “3D Turtle Geometry: Artwork, Theory, Program Equivalence and Symmetry”. *Int. J. of Arts and Technology*, **3**(2/3):288–319 (2010).
- [2] Tom Verhoeff, Koos Verhoeff. “Regular 3D Polygonal Circuits of Constant Torsion”, *Proceedings of Bridges 2009: Mathematics, Music, Art, Architecture, Culture*, pp. 223–230, 2009. URL: [archive.bridgesmathart.org/2009/bridges2009-223.html](http://archive.bridgesmathart.org/2009/bridges2009-223.html)
- [3] Tom Verhoeff, Koos Verhoeff. “From Chain-link Fence to Space-Spanning Mathematical Structures”, *Proceedings of Bridges 2011: Mathematics, Music, Art, Architecture, Culture*, pp. 73–80, 2011. URL: [archive.bridgesmathart.org/2011/bridges2011-73.html](http://archive.bridgesmathart.org/2011/bridges2011-73.html)
- [4] Tom Verhoeff, Koos Verhoeff. “Folded Strips of Rhombuses and a Plea for the  $\sqrt{2} : 1$  Rhombus”, *Proceedings of Bridges 2013: Mathematics, Music, Art, Architecture, Culture*, pp. 71–78, 2013. URL: [archive.bridgesmathart.org/2013/bridges2013-71.html](http://archive.bridgesmathart.org/2013/bridges2013-71.html)
- [5] Tom Verhoeff, Koos Verhoeff. “Three Families of Mitered Borromean Ring Sculptures”, *Proceedings of Bridges 2015: Mathematics, Music, Art, Architecture, Culture*, pp. 53–60, 2015. URL: [archive.bridgesmathart.org/2015/bridges2015-53.html](http://archive.bridgesmathart.org/2015/bridges2015-53.html)
- [6] Tom Verhoeff, Koos Verhoeff. “Three Mathematical Sculptures for the Mathematikon”, *Proceedings of Bridges 2016: Mathematics, Music, Art, Architecture, Education, Culture*, pp. 105–110, 2016. URL: [archive.bridgesmathart.org/2016/bridges2016-105.html](http://archive.bridgesmathart.org/2016/bridges2016-105.html)
- [7] Tom Verhoeff, Koos Verhoeff. “Hopeless Love and Other Lattice Walks”, accepted for Bridges 2017.