

# Visualizing the distributions of the escape paths of quaternion fractals

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## Abstract

The distributions of the escape paths of the points in some quaternion fractal sets are visualized.

## 1 Escape path length and distance histograms

As discussed in [1, 2], a 3D scalar field of quaternion magnitudes (e.g.  $|Z|$ ) results from calculating a quaternion fractal set when using a finite 3D lattice of regularly spaced points as input.

Here we visualize the distributions of the escape paths' length and distance (from endpoint to endpoint).

## References

- [1] Halayka S. *Some visually interesting non-standard quaternion fractal sets* Chaos, Solitons & Fractals Vol. 41, Issue 5
- [2] Halayka S. *Visualizing the escape paths of quaternion fractals* Unpublished
- [3] <http://paulbourke.net/fractals/trajectories/>

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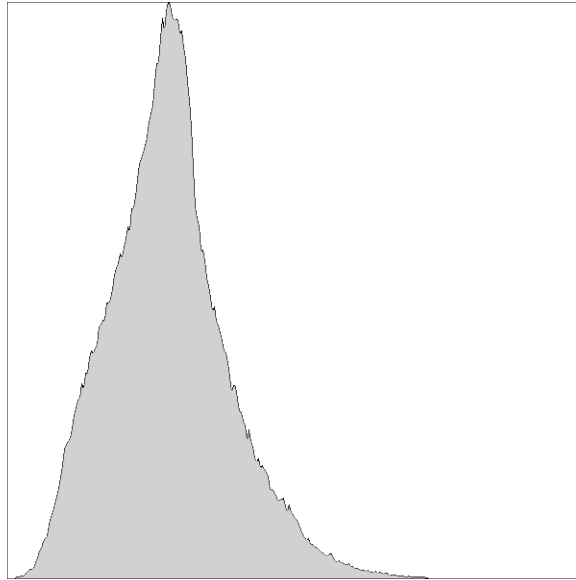


Figure 1: Lengths of  $Z' = Z^2 + C$ , where  $C_{xyzw} = 0.3, 0.5, 0.4, 0.2$ .

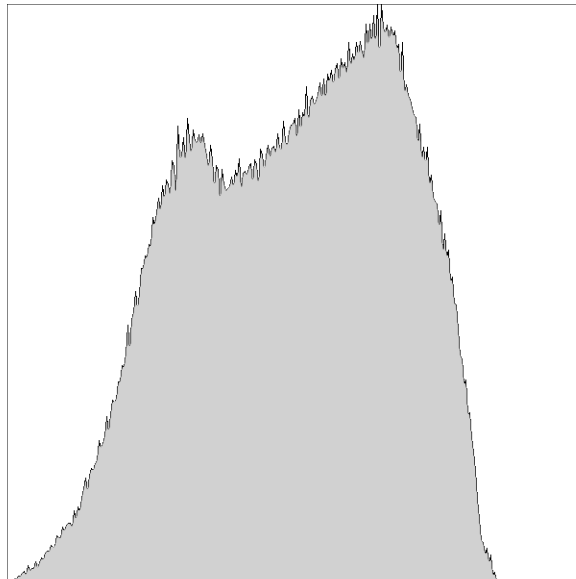


Figure 2: Distances of  $Z' = Z^2 + C$ , where  $C_{xyzw} = 0.3, 0.5, 0.4, 0.2$ .

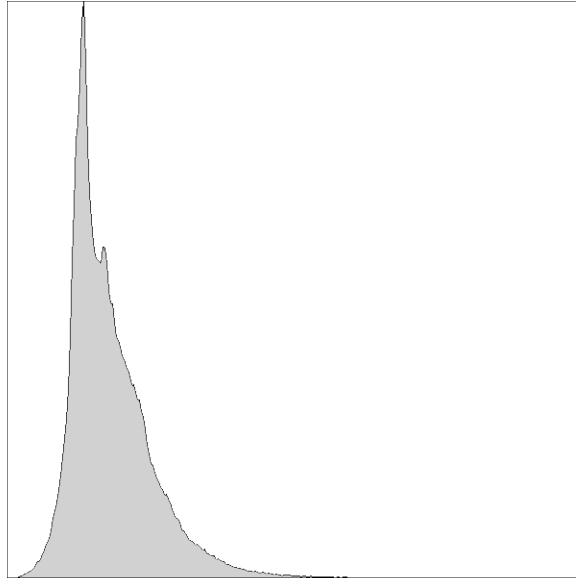


Figure 3: Lengths of  $Z' = Z^5 + C$ , where  $C_{xyzw} = 0.3, 0.5, 0.4, 0.2$ .

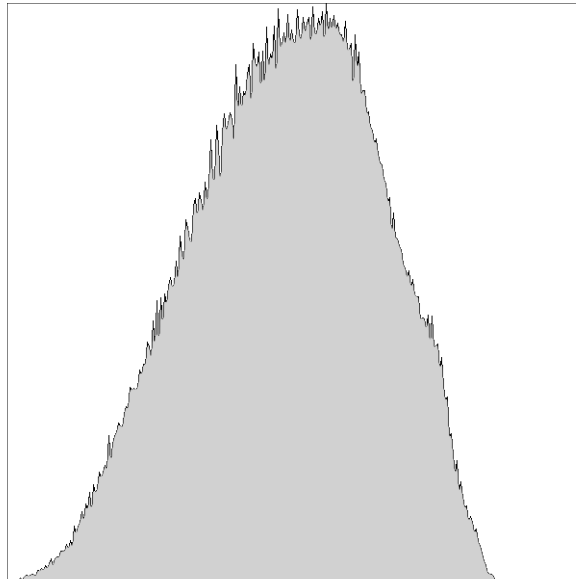


Figure 4: Distances of  $Z' = Z^5 + C$ , where  $C_{xyzw} = 0.3, 0.5, 0.4, 0.2$ .

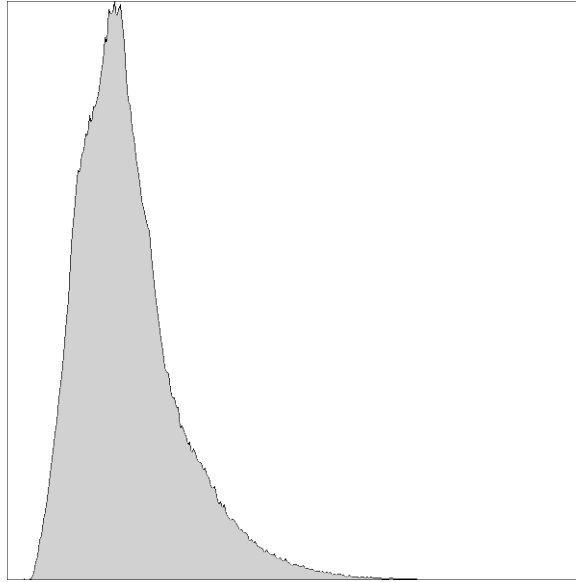


Figure 5: Lengths of  $Z' = \sin(Z) + C \cdot \sin(Z)$ , where  $C_{xyzw} = 0.3, 0.5, 0.4, 0.2$ .

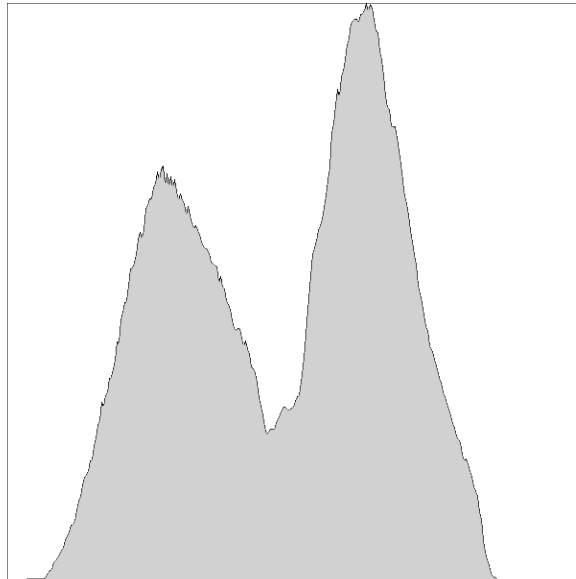


Figure 6: Distances of  $Z' = \sin(Z) + C \cdot \sin(Z)$ , where  $C_{xyzw} = 0.3, 0.5, 0.4, 0.2$ .