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**WHERE DO RIVERS GROW? PATH SELECTION AND GROWTH IN A HARMONIC FIELD.**

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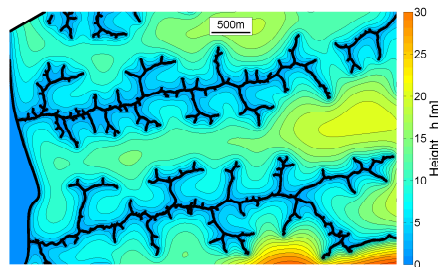
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Key words river channels | principle of local symmetry | harmonic growth | Loewner equation

The complex pattern of river networks has inspired decades of studies. However, the evolution and the dynamics of a growing channel remain elusive. Here we show that the principle of local symmetry, a concept originating in fracture mechanics, explains the path followed by growing streams fed by groundwater. Although path selection does not by itself imply a rate of growth, we additionally show how local symmetry may be used to infer how rates of growth scale with water flux. Our methods are applicable to other problems of unstable pattern formation, such as the growth of hierarchical crack patterns and geologic fault networks, where dynamics is not well understood.



**Figure 1.** Numerical calculation of the height  $h$  of the water table above a seepage network (black) in Bristol, Florida [1].

## References

- [1] Cohen, Y., Devauchelle, O., Seybold, H. F., Yi R. S., Szymczak, P., & Rothman, D. H. (2015). Path selection in the growth of rivers. *Proceedings of the National Academy of Sciences*, 112(46), 14132-14137.