

1058-37-143

James A Yorke* (yorke@umd.edu). *Comparing the period doubling cascades of two maps.*

This is joint work with Evelyn Sander. There are many papers that investigate the properties of a single period-doubling cascade that consists of infinitely many period-doublings. There has very little recognition in the literature that there are typically infinitely many cascades when there is one. Each can be characterized by the minimum period of its orbits. For example the map

$$\mu - x^2$$

has one cascade with minimum period 1; one with minimum period 3; three with minimum period 5, and so on. The theory for this map was established by Milnor and Thurston who showed that the map is “monotonic”. That is as μ increases no orbits are destroyed. Given that property, which is very rarely true, a theory of cascades is simple. In this talk, we compare its behavior with maps like

$$\mu - x^2 + 1000 \cos(\mu^3 + x)$$

which is a massive perturbation of the first map and does not satisfy the monotonicity property. Caveat: Our theory is for generic maps, that is, maps whose saddle-node and period-doublings bifurcations are generic. We allow inverted cascades and period-having bifurcations. Our theory also extends to systems in higher dimensions. (Received February 12, 2010)