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Why Period-Doubling Cascades Occur. Preliminary report.

In numerical investigations, it is common to see "period doubling cascades". In a "cascade", as a map parameter is varied a periodic orbit is seen to undergo an infinite sequence of period doublings. When a cascade exists, Feigenbaum's famous results describe the scaling we should expect to see. But it ignores the question of why these cascades exist. That is the question I address. I will present a number of examples where cascades can be proven to exist. Some of our examples are one dimensional and others are high dimensional strongly coupled families of 1D maps. This is work with Evelyn Sander. (Received September 12, 2008)