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``What really happens when a smooth expanding map is iterated on the computer''

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Smooth expanding maps tend to have very strong ergodicity properties, and these properties can be "observed experimentally" by iterating the map on the computer. What is actually iterated on the computer is, however, not the smooth map itself, but rather a discretization of it -- quite a different kind of mathematical object. It is a fact of experience that iteration of the discretized map usually -- but not always -- mimics remarkably well iteration of the original smooth map. I believe that we do not have anything approaching a satisfactory explanation for this fact. In the talk, I will discuss what I think needs to be shown, make a number of general observations situating the problem, and describe some preliminary results.