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**Angela E Grant\***, 2033 Sheridan Rd., Evanston, IL 60208-2730. *Finding Optimal Orbits on Chaotic Systems.*

Chaotic dynamical systems can exhibit a wide variety of motions, including periodic orbits of arbitrarily large period. I consider the question of which motion is optimal, in the sense that it maximizes the average over time of some given scalar "performance function." Past work has shown that optimal motions tend to be periodic orbits with low period but does not describe, beyond a brute force approach, how to determine which orbit is optimal in a particular scenario. For expanding maps and higher-dimensional hyperbolic maps, I have developed constructive methods for calculating the optimal average and corresponding periodic orbit. These methods, when carried out on a computer, have been found to work quite well in practice. (Received September 20, 2006)