We have developed a structure theory for real analytic diffeomorphisms of compact surfaces very similar to the well-known structure theory of Axiom A diffeomorphisms. This theory has strong implications for the structure of systems with two degrees of freedom. We have shown that there is an at most countable collection of closed invariant sets $i, 2, \ldots$ with the following properties: 1. Any closed invariant set of which has positive topological entropy is a subset of some $i$. 2. A large subset of $i$ has a description as a symbolic space on a countable number of symbols. These results are currently being written up. In addition, we have found a relatively simple proof of our previously established result that there are residual subsets $A$ of open sets of diffeomorphisms with the property that each element in $A$ has infinitely many sinks. A slight modification of this proof will
appear in some notes of Palis and Takens on bifurcation theory presented at a Colloquium in Brazil in July, 1987. Another result states that many systems with two degrees of freedom have fractal basin boundaries with Hausdorff dimension two (i.e. maximal Hausdorff dimension). This leads to the frequent existence of what we call pseudo-attractors-- closed invariant sets with dense orbits whose basins have maximal dimension. Finally, we have made progress on a numerical procedure to estimate topological entropy in low dimensional smooth dynamical systems.
FINAL TECHNICAL REPORT for AFOSR-85-0200

During the tenure of this grant we have made significant progress on several problems.

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1. Any closed invariant set on which $f$ has positive topological entropy is a subset of some $A_i$.

2. A large subset of $A_i$ has a description as a symbolic space on a countable number of symbols.

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The following papers have resulted in part from the support under this grant.

