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CLIFFORD HENRY TAUBES
HARVARD UNIVERSITY

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Asymptotic behavior of dissipative systems, by Jack K. Hale. Mathematical Surveys and Monographs, vol. 25, American Mathematical Society, Providence, R.I., 1988, ix + 198 pp., $54.00. ISBN 0-8218-1527-x

The dynamical systems encountered in physical or biological sciences can be grouped roughly into two classes: the conservative ones (including the Hamiltonian systems) and those exhibiting some type of dissipation. These dynamical systems are often generated by partial differential equations and thus the underlying state space is infinite dimensional.

I. It is natural to expect that the flow defined by a dissipative system shall be simpler than the one of a conservative system. It is perhaps even possible to isolate an interesting class of systems for which one can adapt several ideas coming from the ordinary differential equations (O.D.E's) to the analysis of the flow. If this can be done, then one must overcome the difficulties that arise due to the nonlocal compactness of the state space. This will require some type of "smoothing" property of the dynamical system. There are also problems that can arise at infinity due to the unboundedness of the space. This problem is avoided by imposing specific dissipative conditions. To make the discussion more meaningful and to motivate the class of systems considered in the book under review, it is instructive to recall the situation for the ordinary differential equations.

In his study of the forced van der Pol equation, Levinson [13] introduced the concept "point dissipative." To keep the technicality at a minimum, let us discuss at first discrete dynamical systems; that is, those defined by a map $T : \mathbb{R}^n \to \mathbb{R}^n$. The