Kirchgraber, U.; **Palmer, K. J.**

Geometry in the neighborhood of invariant manifolds of maps and flows in linearization.

(English) Zbl 0746.58008
Pitman Research Notes in Mathematics. 233. Harlow, New York: Longman Scientific & Technical, John Wiley & Sons, Inc. 89 p. (1990).

The book consists of two parts of approximately equal lengths each written by one of the authors. In the first part homomorphisms $P:\mathbb{R}^r\times\mathbb{R}^t\to\mathbb{R}^r\times\mathbb{R}^t$ given by $P(z,y)=(f(z,y),L(y)+Y(z,y))$ are considered where $L:\mathbb{R}^t\to\mathbb{R}^t$ is linear and expanding, and P is (by Lipschitz constraints) sufficiently close to a mapping $P_z\times L$ with $P_z:\mathbb{R}^r\to\mathbb{R}^r$ less expanding than L. Under these assumptions a horizontal and a vertical foliation H, V, respectively of $\mathbb{R}^r\times\mathbb{R}^t$ are constructed such that P maps leaves to leaves. There is an invariant leaf of H which is the graph of a function $G:\mathbb{R}^r\to\mathbb{R}^t$. Using these foliations new coordinates $\bar z$, $\bar y$ can be introduced. (The leaves correspond to the manifolds given by $\bar y=$ const. or $\bar z=$ const., respectively.) With respect to the new coordinates P splits as

$$P(\bar z,\bar y)=(f(\bar z,G(\bar z)),L(\bar y))$$

and is therefore linearized with respect to y. This is applied to get a corresponding linearization for flows given by autonomous differential equations on $\mathbb{R}^r\times\mathbb{R}^t$. In the second part this linearization for the solution of differential equations is constructed directly (also using a horizontal and a vertical foliation).

Reviewer: H.G.Bothe (Berlin)

MSC:

58-02	Research exposition (monographs, survey articles) pertaining to global analysis
37D99	Dynamical systems with hyperbolic behavior
37C10	Dynamics induced by flows and semiflows
37C85	Dynamics induced by group actions other than $\mathbb{Z}$ and $\mathbb{R}$, and $\mathbb{C}$

Keywords:
invariant manifold; foliations; linearization for flows