this number) since all the material covered is available elsewhere, as the author acknowledges, and nowhere has he expanded on the original to any extent.

Chapter I, on the construction of the Godbillon-Vey class for a codimension 1 foliation, is mostly a shortened account of sections 6 and 10 of Bott's Mexico Lecture Notes. The proof of Bott's vanishing theorem would surely benefit from an explicit statement of what a basic connection is and that one always exists for the bundle TM/E, where E is an integrable subbundle of the tangent bundle TM.

The second chapter begins by generalising the Godbillon-Vey class to codimension q, in order to motivate the definition of secondary classes in general. Once again, the description closely follows §10 of Bott. There follows a lengthy account of foliations for which these secondary classes are non-zero. The examples discussed become extremely complicated and I found it impossible to get any geometric feel for the situation from the account given. The author's practice of using inverted commas instead of specifying exactly what is meant does not help.

In Chapter 3, an alternative approach to constructing characteristic classes is described. The presentation, which relies on constructing a homomorphism from the cohomology of the Lie algebra of formal vector fields to the cohomology of the manifold, follows closely some unpublished notes of M. F. Atiyah and serves a useful purpose in making this mathematics more generally available. The Godbillon-Vey class and some of the examples of the previous section are rediscussed in this new setting. A condensed version of the exposé by C. Godbillon which computes the cohomology of the Lie algebra of formal vector fields is given and the connection with distributions, via the Lie algebra of C^∞-vector fields, is discussed, although many details are again left to the reader.

In the fourth and final chapter, an account is given of the work of Gelfand, Feigin and Fuks on the variation of the secondary classes as the foliation varies in a specified way. A meaning can be given to the derivative of a characteristic class with respect to the variation parameter and it is proved that certain classes are rigid, i.e. have zero derivative.

There are two appendices. The first gives an account of the Chern-Weil theory which is basic to the construction of characteristic classes. The prerequisite facts on connections and curvature are also included. The second appendix contains some results from Lie theory, including the Chevalley–Eilenberg Theorem. The proof, the only thing in the book which the author claims is new, is incorrectly presented, although the general method is sound.

Overall I found this a hard book to read. The terminology is highly technical and there is much unnecessary underlining which, as with inverted commas, is often used as a substitute for a definition or explanation. The number of misprints, many quite misleading, is unacceptable. This is perhaps a consequence of the fact that, as with all books in this series, the author's own typescript is reproduced but it does suggest that more efficient checking procedures are needed.

RICHARD WOOLFSON

DICKEY, R. W., *Bifurcation problems in nonlinear elasticity* (Pitman, 1976), 119 pp.

This book provides a lucid exposition of several important papers concerned with the existence, multiplicity and qualitative nature of solutions of non-linear differential equations arising in elasticity theory. An introductory chapter on linear operators on Hilbert space and second order linear differential equations should make the material easily accessible to any postgraduate student. Subsequent chapters discuss differential equations arising from the static problem for the non-linear string and non-linear membrane, from the rotating chain, from the inextensible elastica and from the buckling of the circular plate. There is also a chapter on the positone problems, i.e. equations possessing only positive solutions. The proofs are expressed clearly throughout but there are a fair number of misprints.

Although the book provides good, clear solutions to the particular problems discussed in it, I think it would have been improved by the inclusion of a more general discussion of bifurcation theory. Such a discussion may be found in I. Stakgold, "Branching of solutions of nonlinear equations", *SIAM Review*, **13** (1971). Moreover the papers described in the book were almost all published not later than 1971 and there have been a number of major advances and generalisations in the subject since then. For example:

(1) an abstract theory of global bifurcation has been developed which encompasses many of the global results discussed in the book; see P. H. Rabinowitz, "Some global results for nonlinear eigenvalue problems", *Jour. Functional Anal.*, **7** (1971);
(2) many new results have been established about the multiplicity of solutions of positone problems; see, e.g., H. Amann, "Fixed point equations and nonlinear eigenvalue problems in ordered Banach spaces", *SIAM Review*, **18** (1976);
(3) results, similar to those described for the buckling of circular plates in the book, have been obtained for any smooth bounded plate by P. H. Rabinowitz, "Variational methods for nonlinear elliptic eigenvalue problems", *Indiana Univ. Math. Jour.*, **23** (1974). Also very detailed results on the buckling of rectangular plates have been obtained by G. H. Knightly and D. Sather, "Nonlinear buckled states of rectangular plates", *Arch. Rational Mech. Anal.*, **54** 1974).

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