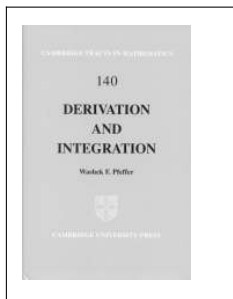


The author succeeds in providing enough background material and details on preparatory material. Each chapter ends with bibliographic notes in which the reader is referred to more background material and detailed proofs of the main results in this excellent book.

F. Dillen



W.F. Pfeffer

### Derivation and integration

Cambridge Tracts in Mathematics, vol. 140  
Cambridge: Cambridge University Press, 2001  
282 p., prijs £50,-  
ISBN 0-521-79268-1

Dit boek is gewijd aan een moeilijk geval van een klassiek probleem: het terugvinden van een functie uit haar afgeleide. In een eerstejaarscollege analyse leert men dat dit mogelijk is als de afgeleide functie Riemann-integreerbaar is. Lebesgue bewees dat een functie  $f$  van  $[0, 1]$  naar  $\mathbf{R}$  Lebesgue-integreerbaar is dan en slechts dan als er een *absoluut continue* functie  $F$  van  $[0, 1]$  naar  $\mathbf{R}$  bestaat zodat bijna overal  $F' = f$ .

Denjoy en Perron vonden onafhankelijk van elkaar een manier om het begrip 'integreerbaar' zo uit te breiden dat eenzelfde bewering juist is voor *gegeneraliseerd absoluut continue* functies. Minder lang geleden wisten Henstock en Kurzweil de Denjoy-Perron-integraal op een derde wijze te definiëren. De auteur is geïnteresseerd in meerdimensionale versies van deze resultaten die leiden tot belangrijke uitbreidingen van de stellingen van Gauss-Green en Stokes.

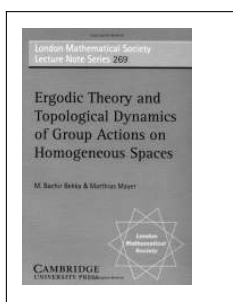
Er is geen voor de hand liggende uitbreiding van de Denjoy-Perron-integraal naar hogere dimensies. Het verschil tussen het eendimensionale en het meerdimensionale geval is erg groot. De technieken uit de theorie van de reële functies moeten worden aangevuld met methoden uit de meetkundige maattheorie. In de zoektocht naar een oplossing van dit vraagstuk speelt de auteur zelf, emeritus hoogleraar wiskunde aan de University of California, Davis, een rol van betekenis. Eerdere boeken van zijn hand zijn *Integrals and Measures* (Marcel Dekker, 1977) en *The Riemann Approach to Integration* (Cambridge University Press, 1993). In de nu besproken monografie wil hij de gevorderde lezer inzicht bieden in de meest recente resultaten. Het boek is helder geschreven en overzichtelijk opgezet.

W.H.M. Veldman

in the study of flows on homogeneous spaces  $G \backslash \Gamma$  where  $G$  is a Lie group and  $\Gamma$  a lattice in  $G$ . This book is an introduction to the ergodic theory and topological dynamics of group actions on homogeneous spaces. The focus is on two types of group actions: the geodesic flow on the unit tangent bundle of a locally symmetric group, and unipotent actions on homogeneous spaces. This book is well written and serves as an excellent introduction to this area. It is accessible to graduate students with background in measure theory, functional analysis, and Lie theory. The emphasis is put on the group theoretic point of view, and on the role of the associated unitary representation of the group action.

Chapter I provides an introduction to ergodic theory and topological dynamics. Special attention is given to stating some dynamical properties, such as ergodicity and the different notions of mixing in representation theoretic terms. Chapter II is devoted to the study of geodesic flows associated to surfaces of constant negative curvature, and their realization as flows on homogeneous spaces of  $SL(2, \mathbf{R})$ . In Chapter III, the authors give a complete proof of Howe-Moore's vanishing theorem on the asymptotics of the matrix coefficients of unitary representations, and its application to mixing properties of the flows. Higher order mixing is also discussed, Ledrappier's famous example of a  $\mathbf{Z}^2$ -action that is strongly mixing but not mixing of all orders is given, as well as Mozes' theorem on mixing of all orders of Lie group actions. Chapter IV deals with horocycle flows. A proof of Hedlund's theorem on the minimality of the horocycle flows for compact surfaces is given; this theorem says that every orbit is either dense or periodic, and minimality holds for a cocompact lattice  $\Gamma$ . Also, the classification of invariant measures and results on equidistribution are discussed. In Chapter V, the authors describe Siegel sets and show that they are approximations to fundamental domains for the action of  $SL(n, \mathbf{Z})$  by translations on  $SL(n, \mathbf{R})$ . This is used to prove Mahler's criterion for compactness of sets of lattices in  $\mathbf{R}^n$ . A full proof is given of Margulis' lemma dealing with recurrence properties of unipotent subgroups of  $SL(n, \mathbf{R})$  in the homogeneous space  $SL(n, \mathbf{R}) \backslash SL(n, \mathbf{Z})$ , namely, that an orbit under such a subgroup never tends to infinity in  $SL(n, \mathbf{R}) \backslash SL(n, \mathbf{Z})$ . Chapter VI contains an application of the derived results to number theory. They give a complete proof of the famous Oppenheim conjecture: if  $Q$  is an indefinite irrational quadratic form over  $\mathbf{R}^n$ ,  $n \geq 3$ , then  $Q(\mathbf{Z}^n)$  is dense. The presented proof is by Dani and Margulis, and is based on the study of the orbit structure of the action of  $SO(Q)$ , the orthogonal group of  $Q$ , on the homogeneous space  $SL(n, \mathbf{R}) \backslash SL(n, \mathbf{Z})$ .

K. Dajani

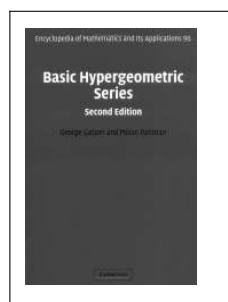


M.B. Bekka, M. Mayer

### Ergodic theory and topological dynamics of group actions on homogeneous spaces

London Math. Soc. Lecture Note Series 269  
Cambridge: Cambridge University Press, 2000  
200 p., prijs £30,-  
ISBN 0-521-66030-0

The interplay between ideas from the theory of algebraic groups on the one hand and ergodic theory on the other is best illustrated



G. Gasper, M. Rahman

### Basic hypergeometric series, 2nd edition

Cambridge: Cambridge University Press, 2004  
428 p., prijs £65,-  
ISBN 0-521-83357-4

Basic hypergeometric series are series of the form  $\sum c_k$  with the property that  $c_{k+1}/c_k$  is a rational function in  $q^k$  for all  $k$  for some fixed number  $q$ , the base, which we assume to satisfy  $|q| < 1$ .