

Contents

Chapter 1. Introduction	1
Chapter 2. Differential function spectra	7
2.1. Differential cohomology – the axioms	7
2.2. The construction of the differential function spectrum	11
2.3. Homotopy groups and long exact sequences	19
2.4. Differential Data and Transformations	23
Chapter 3. Cycle maps	27
3.1. Introduction	27
3.2. Complex K -theory – a warm-up	27
3.3. The spectrum KR	31
3.4. The topological cycle map	33
3.5. Kamber-Tondeur forms	37
3.6. Borel’s regulator	42
3.7. Characteristic forms	45
3.8. The cycle map for geometric locally constant sheaves	50
3.9. Some calculations with $\widehat{KR}^0(*)$	52
3.10. Calculation of $\widehat{KR}^0(*)$	52
3.11. The action of $\text{Aut}(KR, A, c)$.	52
3.12. Determinants	53
3.13. Rescaling the metric	54
3.14. Extension of the cycle maps from projective to finitely generated R -bundles	55
Chapter 4. Transfers in differential cohomology	67
4.1. Introduction	67
4.2. Differential Becker-Gottlieb transfer	67
4.3. Geometric bundles and integration of forms	70
4.4. Transfer structures and the Becker-Gottlieb transfer	73
4.5. The left square in (4.8) and the construction of $\hat{\text{tr}}$	77
4.6. Proof of (4.6)	82
4.7. Functoriality of the transfer for iterated bundles	84
Chapter 5. A transfer index conjecture	89
5.1. Introduction	89
5.2. The statement of the transfer index conjecture	89
5.3. The analytic index	92
5.4. Discussion of the transfer index conjecture	94
5.5. Discussion of Lott’s relation	113

Chapter 6. Technicalities	117
6.1. Categories with weak equivalences and ∞ -categories	117
6.2. Commutative algebras and monoids	124
6.3. Smooth objects	128
6.4. Homotopy invariance	136
6.5. The de Rham complex	142
6.6. Function spectra with proper support	148
6.7. Thom and Euler forms	164
6.8. The normalized Borel regulator map	167
6.9. More normalizations	172
Bibliography	175