

Characteristic classes

Tuesdays, 10:15 — 12:00 Uhr, Seminarraum 0.003

Prof. Dr. W. Lück, Dr. T. Macko

In the seminar we discuss the theory of characteristic classes. These are certain cohomology classes $c(\xi) \in H^*(X)$ which one can associate to a vector bundle $\xi: E \rightarrow X$ over a space X . Characteristic classes are very effective invariants of vector bundles. For example for a 1-dimensional vector bundle its characteristic classes determine its isomorphism type. There is also a connection to the theory of manifolds. To a closed manifold one can associate the characteristic classes of its tangent bundle. These invariants contain a lot of information about the manifold, for example using them one can decide whether a given n -dimensional manifold is a boundary of some other $(n + 1)$ -manifold.

A prerequisite for the seminar is the course Topologie I. Topologie II can be read parallel to the seminar.

Literature: We will mainly use the classical book: [MS74].

Talks

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| (1) Manifolds and vector bundles | DANIEL VALENZUELA
CLAUDIA SARMIENTO |
| 09.04.2012 [MS74, §1,2] | |
| (2) Constructions on vector bundles | DANIEL VALENZUELA
CLAUDIA SARMIENTO |
| 16.04.2012 [MS74, §3] | |
| (3) Stiefel-Whitney classes I | THOMAS ARMHORST
JAKOB BONGARTZ
TIMM VON PUTTKAMMER
NICK RÖDER |
| 23.04.2012 [MS74, §4] part 1 | |
| (4) Stiefel-Whitney classes II | THOMAS ARMHORST
JAKOB BONGARTZ
TIMM VON PUTTKAMMER
NICK RÖDER |
| 30.04.2012 [MS74, §4] part 2 | |

- (5) **Grassmann manifolds I** IULIA SEMIKINA
 JAKUB WITASZEK
 07.05.2012 [MS74, §5]
- (6) **Grassmann manifolds II** IULIA SEMIKINA
 JAKUB WITASZEK
 14.05.2012 [MS74, §6]
- (7) **Cohomology ring of the Grassmannians** ÖGMUNDUR EIRIKSSON
 28.05.2012 [MS74, §7]
- (8) **Existence of the Stiefel-Whitney classes** MALTE LEIP
 04.06.2012 [MS74, §8]
- (9) **Oriented bundles and the Euler class** JENS REINHOLD
 11.06.2012 [MS74, §9]
- (10) **The Thom isomorphism** DAVID MICKISCH
 DAVID ARANHA
 18.06.2012 [MS74, §10]
- (11) **Computations in a smooth manifold I** MICHAEL JIMENEZ
 LUKAS RICHTER
 25.06.2012 [MS74, §11]
- (12) **Computations in a smooth manifold II** MICHAEL JIMENEZ
 LUKAS RICHTER
 02.07.2012 [MS74, §11]
- (13) **The theorem of Thom about bordism** ALEXANDER DOAN
 NÉSTOR LEÓN DELGADO
 09.07.2012 [BH81]

LITERATUR

- [BH81] Sandro Buoncrisiano and Derek Hacon. An elementary geometric proof of two theorems of Thom. *Topology*, 20(1):97–99, 1981.
- [MS74] John Milnor and James D. Stasheff. *Characteristic classes*. Princeton University Press, Princeton, N. J., 1974. Annals of Mathematics Studies, No. 76.