

Alexandru Dimca

Sheaves in Topology



Springer

Contents

1	Derived Categories	1
1.1	Categories of Complexes $C^*(\mathcal{A})$	1
1.2	Homotopical Categories $K^*(\mathcal{A})$	9
1.3	The Derived Categories $D^*(\mathcal{A})$	13
1.4	The Derived Functors of Hom	20
2	Derived Categories in Topology	23
2.1	Generalities on Sheaves	23
2.2	Derived Tensor Products	30
2.3	Direct and Inverse Images	32
2.4	The Adjunction Triangle	43
2.5	Local Systems	47
3	Poincaré-Verdier Duality	59
3.1	Cohomological Dimension of Rings and Spaces	59
3.2	The Functor $f^!$	62
3.3	Poincaré and Alexander Duality	67
3.4	Vanishing Results	72
4	Constructible Sheaves, Vanishing Cycles and Characteristic Varieties	81
4.1	Constructible Sheaves	81
4.2	Nearby and Vanishing Cycles	102
4.3	Characteristic Varieties and Characteristic Cycles	111
5	Perverse Sheaves	125
5.1	t-Structures and the Definition of Perverse Sheaves	125
5.2	Properties of Perverse Sheaves	133
5.3	\mathcal{D} -Modules and Perverse Sheaves	143
5.4	Intersection Cohomology	154

6 Applications to the Geometry of Singular Spaces 165

 6.1 Singularities, Milnor Fibers and Monodromy 165

 6.2 Topology of Deformations 179

 6.3 Topology of Polynomial Functions 193

 6.4 Hyperplane and Hypersurface Arrangements 208

References 223

Index 233