

Yosef Yomdin
Georges Comte

Tame Geometry with Application in Smooth Analysis



Springer

Table of Contents

| | |
|---|------------|
| Preface | V |
| Table of Contents | VII |
| 1 Introduction and Content | 1 |
| 1.1 Motivations | 1 |
| 1.2 Content and Organization of the Book | 4 |
| 1.3 The Motion Planning Problem in Robotics as an Example | 7 |
| 1.4 A Proof of the Morse-Sard Theorem in the Simplest Case | 18 |
| 2 Entropy | 23 |
| 3 Multidimensional Variations | 33 |
| 4 Semialgebraic and Tame Sets | 47 |
| 5 Variations of Semialgebraic and Tame Sets | 59 |
| 6 Some Exterior Algebra | 75 |
| 7 Behaviour of Variations under Polynomial Mappings | 83 |
| 8 Quantitative Transversality and Cuspidal Values | 99 |
| 9 Mappings of Finite Smoothness | 109 |
| 10 Some Applications and Related Topics | 131 |
| 10.1 Applications of Quantitative Sard and Transversality Theorems | 132 |
| 10.1.1 Maxima of smooth families | 132 |
| 10.1.2 Average topological complexity of fibers | 133 |
| 10.1.3 Quantitative Kupka-Smale Theorem | 134 |
| 10.1.4 Possible Applications in Numerical Analysis | 136 |
| 10.2 Semialgebraic Complexity of Functions | 148 |
| 10.2.1 Semialgebraic Complexity | 149 |
| 10.2.2 Semialgebraic Complexity and Sard Theorem | 152 |
| 10.2.3 Complexity of Functions on Infinite-Dimensional Spaces | 153 |

| | |
|---|-----|
| 10.3 Additional Directions | 155 |
| 10.3.1 Asymptotic Critical Values of Semialgebraic and Tame Mappings | 155 |
| 10.3.2 Morse-Sard Theorem in Sobolev Spaces | 156 |
| 10.3.3 From Global to Local: Real Equisingularity | 157 |
| 10.3.4 C^k Reparametrization of Semialgebraic Sets | 158 |
| 10.3.5 Bernstein-Type Inequalities for Algebraic Functions | 159 |
| 10.3.6 Polynomial Control Problems | 161 |
| 10.3.7 Quantitative Singularity Theory | 165 |
| Glossary | 171 |
| References | 173 |