

# Table of contents

## Chapter 1

### Diophantine geometry over function fields: first results

1. Preliminaries. ....	1
2. Geometric Hermite Theorem. ....	7
3. Geometric Chevalley-Weil Theorem. ....	9
4. Geometric Weak Mordell-Weil Theorem. ....	10
5. Geometric heights. ....	11
6. Geometric Mordell-Weil Theorem. ....	17

## Chapter 2

### Classical differential algebra

1. Main concepts. ....	20
2. Division Algorithm. ....	25
3. Differential Basis Theorem. ....	29
4. Differential Elimination Theorem. ....	31
5. Differential Nullstellensatz. ....	33
6. $D$ -modules. ....	37
7. Further results. ....	39

## Chapter 3

### Elements of differential algebraic geometry.

1. Differential regular maps of algebraic varieties. ....	42
2. Prolongations versus torsors. ....	60
3. Differential polynomial functions versus prolongations. ....	68
4. Miscellanea on differential polynomial functions. ....	82
5. Differential regular functions versus differential polynomial ones. ....	91
6. Differential tangent maps. ....	104

## **Chapter 4**

### **Rational varieties from the differential algebraic standpoint**

1. Differential regular sections of vector bundles. ....	111
2. The projective line. ....	114
3. Remarks on the differential Lüroth problem. ....	118
4. Differential density of rational points. ....	119

## **Chapter 5**

### **Abelian varieties from the differential algebraic standpoint**

1. Structure of $A^\infty$ . ....	121
2. Differential character maps of abelian varieties. ....	127
3. Differential tangent maps of differential character maps. ....	130
4. Quotients of abelian varieties. ....	136

## **Chapter 6**

### **Differential algebraic analogues of diophantine questions**

1. Differential algebraic descent method. ....	141
2. Finiteness Theorem for differential Lagrangian maps. ....	147
3. Differential algebraic analogue of Lang's conjecture. ....	152
4. Infinitesimal analogue of Lang's conjecture. ....	154
5. Differential algebraic analogue of the Isogeny Theorem. ....	156

## **Chapter 7**

### **Diophantine geometry over function fields: conclusion**

1. Geometric Lang Conjecture. ....	163
2. Geometric Mordell Conjecture. ....	164
3. Geometric Siegel Theorem. ....	168

<b>Appendix: Big Picard</b> .....	170
-----------------------------------	-----

<b>References</b> .....	175
-------------------------	-----

<b>Index of terminology</b> .....	179
-----------------------------------	-----

<b>Index of notations.</b> .....	182
----------------------------------	-----