



# **SJÄLVSTÄNDIGA ARBETEN I MATEMATIK**

MATEMATISKA INSTITUTIONEN, STOCKHOLMS UNIVERSITET

## **Gröbner Bases and Elimination in Macaulay 2**

av

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# Gröbner Bases and Elimination in Macaulay 2

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## Abstract

Your summary goes here



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# 1 Introduction

Hello world

[DAC10]

[LM21]



## 2 What is Algebraic Geometry?

### 2.1 Polynomials

### 2.2 Affine Varieties

### 2.3 Rings and Ideals

### 2.4 Ordering Polynomials

### 2.5 An Analytic Bridge

### 2.6 Hilbert Strong Nullstellensatz

## 3 Gröbner Bases

### 3.1 Hilbert Bases

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## References

- [DAC10] Donal B O'Shea David A Cox, John Little. *Ideals, Varieties, and Algorithms: An Introduction to Computational Algebraic Geometry and Commutative Algebra*. Springer Publishing Company, third edition, November 2010.
- [LM21] Antonio Tornambè Laura Menini, Corrado Possieri. *Algebraic Geometry for Robotics and Control Theory*. WORLD SCIENTIFIC (EUROPE), 2021. URL: <https://www.worldscientific.com/doi/abs/10.1142/q0308>, arXiv:<https://www.worldscientific.com/doi/pdf/10.1142/q0308>, doi:[10.1142/q0308](https://www.worldscientific.com/doi/abs/10.1142/q0308).