



# Methods of Algebraic Geometry in Control Theory: Part I: Scalar Linear Systems and Affine Algebraic Geometry (Systems & Control: Foundations & Applications) (Pt. 1)

By Peter Falb

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Control theory represents an attempt to codify, in mathematical terms, the principles and techniques used in the analysis and design of control systems. Algebraic geometry may, in an elementary way, be viewed as the study of the structure and properties of the solutions of systems of algebraic equations. The aim of these notes is to provide access to the methods of algebraic geometry for engineers and applied scientists through the motivated context of control theory. I began the development of these notes over fifteen years ago with a series of lectures given to the Control Group at the Lund Institute of Technology in Sweden. Over the following years, I presented the material in courses at Brown several times and must express my appreciation for the feedback (sic!) received from the students. I have attempted throughout to strive for clarity, often making use of constructive methods and giving several proofs of a particular result. Since algebraic geometry draws on so many branches of mathematics and can be dauntingly abstract, it is not easy to convey its beauty and utility to those interested in applications. I hope at least to have stirred the reader to seek a deeper understanding of this beauty and utility in control theory. The first volume deals with the simplest control systems (i. e. single input, single output linear time-invariant systems) and with the simplest algebraic geometry (i. e. affine algebraic geometry).

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- Sales Rank: #3325315 in Books
- Brand: Brand: Birkhäuser
- Published on: 1990-07-01
- Original language: English
- Number of items: 1
- Dimensions: 9.21" h x .56" w x 6.14" l, 1.06 pounds
- Binding: Hardcover
- 204 pages

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Review

"This book is a concise development of affine algebraic geometry together with very explicit links to the applications...[and] should address a wide community of readers, among pure and applied mathematicians."  
**?Monatshefte für Mathematik**

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