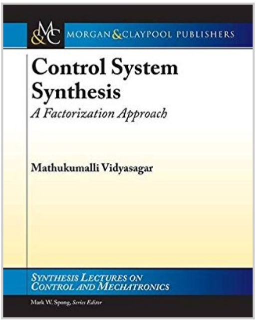


# Control Systems Synthesis: A Factorization Approach, Part I (Synthesis Lectures on Control and Mechatronics)

*By Mathukumalli Vidyasagar*



**Control Systems Synthesis: A Factorization Approach, Part I (Synthesis Lectures on Control and Mechatronics)** By Mathukumalli Vidyasagar

This book introduces the so-called ""stable factorization approach"" to the synthesis of feedback controllers for linear control systems. The key to this approach is to view the multi-input, multi-output (MIMO) plant for which one wishes to design a controller as a matrix over the fraction field F associated with a commutative ring with identity, denoted by R, which also has no divisors of zero. In this setting, the set of single-input, single-output (SISO) stable control systems is precisely the ring R, while the set of stable MIMO control systems is the set of matrices whose elements all belong to R. The set of unstable, meaning not necessarily stable, control systems is then taken to be the field of fractions F associated with R in the SISO case, and the set of matrices with elements in F in the MIMO case. The central notion introduced in the book is that, in most situations of practical interest, every matrix P whose elements belong to F can be ""factored"" as a ""ratio"" of two matrices N,D whose elements belong to R, in such a way that N,D are coprime. In the familiar case where the ring R corresponds to the set of bounded-input, bounded-output (BIBO)-stable rational transfer functions, coprimeness is equivalent to two functions not having any common zeros in the closed right half-plane including infinity. However, the notion of coprimeness extends readily to discrete-time systems, distributed-parameter systems in both the continuous- as well as discrete-time domains, and to multi-dimensional systems. Thus the stable factorization approach enables one to capture all these situations within a common framework. The key result in the stable factorization approach is the parametrization of all controllers that stabilize a given plant. It is shown that the set of all stabilizing controllers can be parametrized by a single parameter R, whose elements all belong to R. Moreover, every transfer matrix in the closed-loop system is an affine function of the design parameter R. Thus problems of reliable stabilization, disturbance rejection, robust stabilization etc. can all be formulated in terms of choosing an appropriate R.

**Read Online** Control Systems Synthesis: A Factorization Appro ...pdf

# Control Systems Synthesis: A Factorization Approach, Part I (Synthesis Lectures on Control and Mechatronics)

*By Mathukumalli Vidyasagar*

**Control Systems Synthesis: A Factorization Approach, Part I (Synthesis Lectures on Control and Mechatronics)** By Mathukumalli Vidyasagar

This book introduces the so-called ""stable factorization approach"" to the synthesis of feedback controllers for linear control systems. The key to this approach is to view the multi-input, multi-output (MIMO) plant for which one wishes to design a controller as a matrix over the fraction field F associated with a commutative ring with identity, denoted by R, which also has no divisors of zero. In this setting, the set of single-input, single-output (SISO) stable control systems is precisely the ring R, while the set of stable MIMO control systems is the set of matrices whose elements all belong to R. The set of unstable, meaning not necessarily stable, control systems is then taken to be the field of fractions F associated with R in the SISO case, and the set of matrices with elements in F in the MIMO case. The central notion introduced in the book is that, in most situations of practical interest, every matrix P whose elements belong to F can be ""factored"" as a ""ratio"" of two matrices N,D whose elements belong to R, in such a way that N,D are coprime. In the familiar case where the ring R corresponds to the set of bounded-input, bounded-output (BIBO)-stable rational transfer functions, coprimeness is equivalent to two functions not having any common zeros in the closed right half-plane including infinity. However, the notion of coprimeness extends readily to discrete-time systems, distributed-parameter systems in both the continuous- as well as discrete-time domains, and to multi-dimensional systems. Thus the stable factorization approach enables one to capture all these situations within a common framework. The key result in the stable factorization approach is the parametrization of all controllers that stabilize a given plant. It is shown that the set of all stabilizing controllers can be parametrized by a single parameter R, whose elements all belong to R. Moreover, every transfer matrix in the closed-loop system is an affine function of the design parameter R. Thus problems of reliable stabilization, disturbance rejection, robust stabilization etc. can all be formulated in terms of choosing an appropriate R.

**Control Systems Synthesis: A Factorization Approach, Part I (Synthesis Lectures on Control and Mechatronics) By Mathukumalli Vidyasagar Bibliography**

- Sales Rank: #5395479 in Books
- Published on: 2011-06-15
- Original language: English
- Number of items: 1
- Dimensions: 9.25" h x .78" w x 7.50" l, 1.30 pounds
- Binding: Paperback
- 184 pages

**Download and Read Free Online Control Systems Synthesis: A Factorization Approach, Part I (Synthesis Lectures on Control and Mechatronics) By Mathukumalli Vidyasagar**

---

## Editorial Review

## Users Review

### From reader reviews:

**Desiree Schwindt:**

As people who live in the particular modest era should be upgrade about what going on or info even knowledge to make these people keep up with the era which is always change and progress. Some of you maybe will certainly update themselves by reading books. It is a good choice to suit your needs but the problems coming to you actually is you don't know what kind you should start with. This Control Systems Synthesis: A Factorization Approach, Part I (Synthesis Lectures on Control and Mechatronics) is our recommendation to make you keep up with the world. Why, because this book serves what you want and need in this era.

**Homer Smith:**

Why? Because this Control Systems Synthesis: A Factorization Approach, Part I (Synthesis Lectures on Control and Mechatronics) is an unordinary book that the inside of the book waiting for you to snap this but latter it will surprise you with the secret this inside. Reading this book beside it was fantastic author who write the book in such remarkable way makes the content inside easier to understand, entertaining technique but still convey the meaning completely. So , it is good for you because of not hesitating having this any more or you going to regret it. This amazing book will give you a lot of rewards than the other book include such as help improving your skill and your critical thinking way. So , still want to delay having that book? If I had been you I will go to the book store hurriedly.

**Kenneth Allen:**

Many people spending their period by playing outside along with friends, fun activity using family or just watching TV the whole day. You can have new activity to spend your whole day by looking at a book. Ugh, do you consider reading a book can definitely hard because you have to accept the book everywhere? It fine you can have the e-book, getting everywhere you want in your Mobile phone. Like Control Systems Synthesis: A Factorization Approach, Part I (Synthesis Lectures on Control and Mechatronics) which is finding the e-book version. So , try out this book? Let's see.

**Megan Urick:**

A lot of e-book has printed but it takes a different approach. You can get it by net on social media. You can choose the best book for you, science, comedian, novel, or whatever by simply searching from it. It is known as of book Control Systems Synthesis: A Factorization Approach, Part I (Synthesis Lectures on Control and

Mechatronics). You can add your knowledge by it. Without making the printed book, it may add your knowledge and make anyone happier to read. It is most significant that, you must aware about book. It can bring you from one destination for a other place.

## Download and Read Online Control Systems Synthesis: A Factorization Approach, Part I (Synthesis Lectures on Control and Mechatronics) By Mathukumalli Vidyasagar #6R2Q7L30VB5

# Read Control Systems Synthesis: A Factorization Approach, Part I (Synthesis Lectures on Control and Mechatronics) By Mathukumalli Vidyasagar for online ebook

Control Systems Synthesis: A Factorization Approach, Part I (Synthesis Lectures on Control and Mechatronics) By Mathukumalli Vidyasagar Free PDF d0wnl0ad, audio books, books to read, good books to read, cheap books, good books, online books, books online, book reviews epub, read books online, books to read online, online library, greatbooks to read, PDF best books to read, top books to read Control Systems Synthesis: A Factorization Approach, Part I (Synthesis Lectures on Control and Mechatronics) By Mathukumalli Vidyasagar books to read online.

## Online Control Systems Synthesis: A Factorization Approach, Part I (Synthesis Lectures on Control and Mechatronics) By Mathukumalli Vidyasagar ebook PDF download

### Control Systems Synthesis: A Factorization Approach, Part I (Synthesis Lectures on Control and Mechatronics) By Mathukumalli Vidyasagar Doc

#### Control Systems Synthesis: A Factorization Approach, Part I (Synthesis Lectures on Control and Mechatronics) By Mathukumalli Vidyasagar Mobipocket

#### Control Systems Synthesis: A Factorization Approach, Part I (Synthesis Lectures on Control and Mechatronics) By Mathukumalli Vidyasagar EPub

#### 6R2Q7L30VB5: Control Systems Synthesis: A Factorization Approach, Part I (Synthesis Lectures on Control and Mechatronics) By Mathukumalli Vidyasagar