

Book Review

Adaptive Structures: Dynamics and Control

R. L. Clark, W. R. Saunders, and G. P. Gibbs, Wiley, New York, 1998, 467 pp., \$95.00

This text is a rather broad synthesis of topics collected into nine chapters, three appendices, and a collection of MATLABTM operators in an appended diskette. The chapter titles are as follows: 1) Overview of Adaptive Structures; 2) A Review of Structural Dynamics; 3) Linear Systems and Signals; 4) Signal Processing and Digital Filters; 5) Transduction Device Dynamics and the Physical System; 6) Integration of Spatial and Temporal Signal Processing; 7) Classical Control for Adaptive Structures; 8) Active Control: System Architectures and Algorithms; and 9) Adaptive Structures: Dynamics and Control.

The text is concerned with the analysis, design, and synthesis of linear structures, sensors, and actuators and documentation of associated linear system analysis tools. Six of the nine chapters (the first four, as well as substantial portions of Chapters 7 and 8) are largely the authors' renditions of classical and conventional developments in structural dynamics, linear dynamical systems, signal processing, and linear control theory. One will find here a large fraction of the available end products of linear control theory, including linear quadratic regulators; H_2 , H_∞ , root locus, and Bode analysis/synthesis methods; and infinite/finite impulse filters, etc. The treatment is uneven and in some sections reads like a handbook. By and large, however, this broad collection of traditional topics is treated in a readable fashion, and the synthesis of topics will be found convenient to most students.

The most unique material lies in Chapters 5, 6, and 9, where the integration of sensors, actuators, spatial/tem-

poral signal processing, adaptive filtering, and adaptive control is presented. In particular, the developments of Chapter 9 provide treatments of active acoustic control and vibration control. These developments include sensor/actuator placement, transducer selection and design, and adaptive signal processing. Also evident throughout the text is the effective inclusion and integration of both the wave and modal descriptions of structural dynamics, as well as time/frequency domain analysis techniques. The treatment considers theory, computation, design, and experimental results, and it is these holistic treatments of the material that will make the book a worthwhile addition to the bookshelves of students and professionals in the field.

I did not exercise the algorithms in the MATLAB diskette, which include the operators used to generate the numerical and graphical examples throughout the text. In looking over these files, I am optimistic these operators will be found to be a useful addition to most MATLAB function collections and should increase the utility and impact of this text.

In summary, I recommend this text and believe it will find a home on the desks of many students, engineers, and researchers in this rapidly evolving multidisciplinary field.

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