Foundations of deterministic and stochastic control by Jon H. Davis, Birkhauser Verlag AG, Klösterberg 23, CH–4010, Basel, Switzerland, 2002, pp. 421, sFr.158.

This is a graduate-level textbook of deterministic and stochastic control in the 'Systems and control: Foundations and applications' series of Birkhauser. It covers a diverse collection of topics, as summarized below.

The first chapter is a compact treatment of linear system theory covering standard topics such as controllability, observability, realization theory (to which an unusually large number of pages are devoted) and a dash of linear system identification. The second chapter deals with the least squares control problem in detail. Chapter 3 deals with stability theory, covering Liapunov stability and input–output stability. Chapter 4 is on random processes and essentially covers the second-order theory. This leads to the Kalman–Bucy filter, which is covered in the next chapter. Chapter 6 deals with the continuous time counterparts of these results, followed by Chapter 7 on the celebrated separation theorem, the pinnacle of linear least squares theory. Chapter 8 deals with observers, an elegant and important topic often overlooked in many courses on linear systems. Chapter 9 deals very briefly with nonlinear and finite state models. Chapter 10 is a concise account of Wiener–Hopf theory in frequency domain, which forms a backdrop for the remaining chapters. These chapters essentially deal with control and estimation in distributed parameter systems using the aforementioned methods and associated computational issues. They are titled respectively distributed system regulators, filters without Riccati equations, Newton's method for Riccati equations, and numerical spectral factorization. Of these, the second deals with a frequency domain derivation of linear least squares filters for a class of distributed parameter systems. The other titles speak for themselves.

The first half of the book is an adequate treatment of linear systems and linear least squares theory, though as already mentioned, the emphasis on realization theory is perhaps a little unusual. Also, the rather nominal account of linear system identification does not achieve much and could have been simply left out. The treatment of nonlinear and finite state models in Chapter 9 is at best cursory and is all right if the intention is to give the reader a taste of the subject but nothing more. The inclusion of the later chapters would be unusual in a standard course and seem to have been included by virtue of being close to the author's own research interests. They do, however, mark this book as distinct from others, as these themes may not be found elsewhere in this form.

Now for a comparison with other books in the market: This book is less advanced in its mathematical treatment of control theory than the texts [1] and [2] published in the same series. For its coverage of deterministic control, it is less comprehensive than [3]. As for a basic first course, I would any day prefer the two-volume work [4], [5] for its lucidity and excellent coverage. The strength of the book under review lies in the choice of the specialized topics it contains, which may not be found in this form elsewhere. Also, the first half would make a good standard course in linear control, though this distinction is shared by many.

1. Vinter, R., *Optimal control*, Birkhauser, 2000.

2. Zabczyk, J., *Mathematical control theory*: *An introduction*, Birkhauser, 1993.

3. Sontag, E.D., *Mathematical control theory*: *Deterministic finite dimentional systems* (2nd edn), Springer-Verlag, 1998.

4. Bertsekas, D.P., *Dynamic programming and optimal control*, Vol. 1 (2nd edn), Athena Scientific, 1995.

5. Bertsekas, D.P., *Dynamic programming and optimal control*, Vol. 2, Athena Scientific, 1995.

Professor, School of Technology and Computer Science, Vivek S. Borkar
Tata Institute of Fundamental Research,
Mumbai 400 005, India.
email: borkar@tifr.res.in