

Book Reviews

State Models of Dynamic Systems: A Case Study Approach,
N. H. McClamrock, Springer-Verlag, 1980.

This is an undergraduate text for a course dealing with the development of state models for dynamic processes. As clearly stated in the title, the pedagogic method of the book is primarily a case study approach. A typical chapter begins with a rudimentary discussion of some topic of systems theory, but the remainder and majority of the chapter consists of descriptions and analyses of particular dynamic systems and processes.

The first four chapters of the book are devoted to modeling philosophy and systems described by linear constant coefficient systems. The topics covered in these chapters include the concept of state, state equations, time and frequency response, impulse response, characteristic equations, phase plane, natural frequency and damping ratio, and stability. The case studies discussed in these chapters include models for the radioactive decay of cesium, the ingestion and metabolism of a drug, an automobile suspension system, a magnetic loud speaker, and many other diverse systems.

Chapters five through seven discuss the topic of nonlinear systems. Separation of variables, Taylor linearization, and phase plane are the theoretical subjects discussed in these chapters. Case studies include models for the management of a fisheries resource, the underwater launching of a rocket, and a continuous flow stirred tank chemical reactor.

The last two chapters are devoted to systems described by differential - differences and discrete time state models. Case studies included here are the feedback control of the liquid level in a tank with measurement delay, sampled control of a field actuated motor, a neuron model, and a coin operated dispenser.

This book is an excellent resource book for either the teacher or student interested in seeing a wide variety of dynamic systems examples which are involved enough to use many of the tools of system dynamics, but simple enough to be presented in a fifty minute lecture. It could also be used successfully as a text if one were willing either to stick to the limited amount of system techniques developed or to develop additional material to supplement the book.