

---

**Reviewed by  
Reza Langari**

*Department of  
Mechanical Engineering  
Texas A&M University  
College Station, Texas 77843-3123*

## **BOOK REVIEW**

### **FUZZY SYSTEMS THEORY AND ITS APPLICATIONS**

By Toshiro Ternaο, Kiyοji Asai, and Michio Sugeno, Academic Press, New York, 1992, 268 pp., \$49.95.

For those who have been waiting for a textbook that captures and presents fuzzy set theory at the proper level of sophistication, and without requiring a strong mathematical background, *Fuzzy Systems Theory and Its Applications*, by Terano, Asai, and Sugeno is for the most part worth the wait. It clearly does have a few shortcomings, among which a certain loss of expressiveness that results from the translation of the original Japanese into English and some typographical errors are perhaps the most disappointing. All in all, however, the book does achieve what it sets out to do and that is to introduce the technically aware but unfamiliar with fuzzy sets and systems to the essential aspects of this theory and its implications in the practice of engineering.

The book starts with an introductory chapter that focuses on the rationale for the application of fuzzy set theory in engineering intelligent systems and recounts areas of active research and development, which range from process control to environmental assessment and social psychology. In the midst of what may be considered unbounded enthusiasm for this theory, however, the authors do caution the reader that "if the problem . . . is not fully understood, there will be no results," and that "as with other models there are both good points and shortcomings to fuzzy models."

The book continues with an eloquent introduction to fuzzy sets theory, followed by a

thorough description of the basic operations on fuzzy sets. Examples and appropriate but not excessive use of graphics help illustrate these ideas and make the subsequent discussion of fuzzy logic and the associated computational logical operations relatively simple to understand. Chapter Three focuses on fuzzy relations, which, as the authors point out, constitute an essential aspect of fuzzy set theory from the standpoint of its application in both hard and soft sciences.

The remainder of the book, for the most part, focuses on the application of fuzzy set theory. There are theoretical concepts such as fuzzy quantification and fuzzy mathematical programming, intermingled with the discussion of the application areas. Nearly two-thirds of the book, however, is dedicated to the usage of the basic constructs of fuzzy set theory in areas ranging from robotics and control to information retrieval and data base management systems. The book concludes with a chapter on expert systems for damage assessment, an area of interest to structural engineers, among others.

All in all, the book is an excellent introduction to fuzzy sets and systems, and, while translation from Japanese could have been done more professionally, the authors' depth of knowledge of the theory and their involvement in its application to a wide array of engineering problems clearly make the book worthwhile.