AVO, by Satinder Chopra and John P. Castagna, ISBN 978-1-560-80319-5, 2014, SEG, 304 p., US $149, US $119 (member price), US $95 (student price).

The AVO concept was introduced in the early 1980s and triggered enormous interest. In about 10 years (1993), SEG published two books on AVO. Since then, there have been many new developments in AVO analysis. This book does a great job of compiling the latest developments and growing knowledge on the subject. Both Chopra and Castagna are world-known geophysicists, and they have contributed much progress on AVO analysis themselves.

This book begins with a brief discussion on the basics of seismic-wave propagation, including elastic media, types of waves, Poisson's ratio, and partition of energy, easy to read and just enough information for relating to AVO. Chapter 2 discusses estimation of rock properties and how they are used to predict a rock's pore-fluid properties and saturation. This chapter includes the use of Gassmann's equations and fluid substitution. The 30 equations and 23 illustrative graphs serve as a good reference for practitioners. Chapter 3 presents early seismic observations and how they led to the birth of AVO analysis. The 12 seismic sections were carefully selected; along with well-written text, they document the history of AVO and are appealing to many readers. Chapter 4 examines the various approximations for Zoeppritz equations and identifies clearly the assumptions and limitations of each approximation. The 31 equations are comprehensive and cannot be found in any single paper. Chapter 5 lists factors that affect seismic amplitudes during wave propagation, with suggestions to compensate for or eliminate their effects. This chapter also discusses processing considerations important for AVO analysis and describes how AVO attributes are extracted. Chapter 6 explores the various techniques used in AVO interpretation. Finally, topics including the influence of anisotropy in AVO analysis, the use of AVO inversion, estimation of uncertainty in AVO analysis, converted-wave AVO, and the future of the AVO method are discussed.

I enjoyed reading this book, especially the numerous well-selected, real-data examples of seismic sections. The equations it includes are comprehensive enough for it to serve as a handbook for AVO workers. The figures and graphs are clearly illustrated and insightful. The text is well written, understandable, and consistent.

The information furnished in this book gives readers the latest, most up-to-date knowledge on AVO, and in so doing, it is immensely and equally helpful to new entrants in the field and to seasoned workers. I believe the book will provide a sufficient dose to whet the appetite of all geophysicists, geologists, and practitioners who are engaged in reservoir characterization, whether their endeavor is by direct determination of the presence of hydrocarbons from seismic data or by discrimination between anomalies caused by lithology and those caused by hydrocarbons.

— Joseph Zhu