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Paul J. Nahin: The Mathematical Radio: Inside the Magic of AM, FM, and Single-Sideband, Princeton University Press, 2024. ISBN:978-0-69123-531-8, GBP 22.00, 376 pp.

REVIEWED BY EDWARD L. BACH

The book title is "The Mathematical Radio: Inside the Magic of AM, FM, and Single-Sideband". This suggests that the author, Paul J. Nahin, wishes to discuss mathematical aspects of radio technology, and that he regards this technology as something magical. In order to enjoy the book, readers need to expend some effort to immerse themselves in the mathematical and technological detail, while keeping in mind that the mathematics is beautiful and the technology enables them to have magical experiences. It is not a book that can be easily skimmed, and there are a lot of equations and circuit diagrams.

There seem to be two motivations for writing the book: the passion of an early and lifelong radio hobbyist, and the irritation of an applied mathematician, who has read "A Mathematician's Apology" and, instead of perhaps taking Hardy's opinions with a grain of salt, has taken them to heart. If the reader is not on the same wavelength as the author, the book can appear a bit laboured in places.

The book follows the history of radio and starts with the problem of how to generate and receive radio signals. It is recommended to read the appendix on Maxwell's equations first. There are further chapters on multiplier circuits, AM, sideband, and FM radio. The author points out the mathematical theories and results which impact or motivate the design of the components used in radio transmission and reception, and provides challenge problems at the end of each chapter, to allow the reader to work through some of the details or to elaborate on statements made in the chapter text.

A reader who has a good grounding in second-year university mathematics and physics should be able to understand the text and do the problems. Both text and problems provide a detailed illustration of how mathematical equations and techniques underpin a real world application.

It is not clear to me how this book would be used in teaching; I suppose it would be possible to include it as part of a one-term mathematical methods course. I believe the book is intended more for mathematicians to read for recreation or for enrichment.

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