

Musimathics, Volume 2: The Mathematical Foundations of Music by Gareth Loy



[A Good Book On Musical Signal Processing Concepts](#)

Mathematics can be as effortless as humming a tune, if you know the tune, writes Gareth Loy. In *Musimathics*, Loy teaches us the tune, providing a friendly and spirited tour of the mathematics of music—a commonsense, self-contained introduction for the nonspecialist reader. Volume 2 of *Musimathics* continues the story of music engineering begun in volume 1, focusing on the digital and computational domain. Loy goes deeper into the mathematics of music and sound, beginning with digital audio, sampling, and binary numbers, as well as complex numbers and how they simplify representation of musical signals. Chapters cover the Fourier transform, convolution, filtering, resonance, the wave equation, acoustical systems, sound synthesis, the short-time Fourier transform, and the wavelet transform. These subjects provide the theoretical underpinnings of today's music technology. The material in volume 1 is all preparatory to the subjects presented in this volume, although either volume can be read independently. Cross-references to volume 1 are provided for concepts introduced in the earlier volume, and additional mathematical orientation is offered where necessary. The topics are all subjects that contemporary composers, musicians, and music engineers have found to be important. The examples given are all practical problems in music and audio. The level of scholarship and the pedagogical approach also make *Musimathics* ideal for classroom use. Additional material can be found at a companion web site.

My Personal Review:

If you are to really understand what is going on in this book you need volume one where the foundations are discussed. Likewise, volume one of *Musimathics* will often stop short of a truly complete explanation and say that further study will be picked up in volume two. Thus, these two volumes are actually just the halves of one book. However, if you are interested in musical signal processing, you probably need to read volume two. It

covers much ground in depth, and gives numerous examples that are very practical and accessible for people who are working with musical and audio signals. The appendix has some useful tutorials and tables involving mathematics if you happen to be rusty. The following is the table of contents:

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Musimathics, Loy teaches us the tune, providing a friendly and spirited tour of the mathematics of music — a commonsense, self-contained introduction for the nonspecialist reader. It is designed for musicians who find their art increasingly mediated by technology, and for anyone who is interested in the intersection of art and science. Gareth Loy.Â loy79076_fm.fm Page iii Wednesday, April 26, 2006 11:53 AM. Musimathics The Mathematical Foundations of Music Volume 1. Gareth Loy. The MIT Press Cambridge, Massachusetts London, England. Musimathics The Mathematical Foundations of Music. Volume 2. Gareth Loy.Â This second volume of Musimathics continues the story of music engineering begun in volume I. It takes a deeper cut into the mathematics of music and sound, including Â· Digital audio, sampling, binary numbers Â· Complex numbers and how they simplify representation of musical signals Â· Fourier transform, convolution, and filtering Â· Resonance, the wave equation, and the behavior of acoustical systems Â· Sound synthesis Â· The short-time Fourier transform and the wavelet transform. The material in volume I was all preparatory to the subjects introduced in this volume, although this volume can cert