“Physics in Canada” Book Review
“La Physique au Canada” Critique de livre

A Student's Guide to Fourier Transforms With Applications in Physics and Engineering, Third Edition, by J. F. James, Cambridge University Press, 2011, pp: 146, $29.99

This small and relatively inexpensive book could be useful for physics students, with many of the worked examples taken from the field of optics. It provides a couple of fairly standard introductory chapters, and clarifies the varying definitions of the Fourier transform that can be confusing to students (in fact championing use of the frequency as opposed to angular frequency, in order to give clearer definitions). Of three chapters on applications, two are about optics and one about signal processing. Some diagrams have unlabeled or unclearly labeled axes, for example in the diffraction section where one would hope the several angles involved would be made the most clear. Aliasing is dealt with in a cursory fashion, and the simple analog means to prevent it are not discussed. There being one short chapter on signal processing, it seems like some important topics are left out, such as the practical (digital and analog) implementation of filters. Two and higher dimensional Fourier transforms are dealt with using interesting examples. Discussion of the digital implementation of the Fourier transform, and the FFT, is minimal. A BASIC program is provided for doing FFTs: likely this is now of minimal utility, and updating to give references to modern programs for FFTs (fftw comes to mind) might have been a better use of space. The book is likely most suited as a supplement, and that could be envisaged in several courses, ranging from optics to mathematical methods for physics students. A useful bibliography points to some of the standard books such as those of Bracewell and Brigham. Courses using those books could benefit from using the worked examples in this one, and again most particularly if the aim is to understand the use of the Fourier transform in optics.

Martin Connors
Athabasca University