are as follows:

$$\tau_c = \sqrt{\frac{2\ln 2}{\pi}} \cdot \frac{1}{\Delta\nu} = \frac{0.664}{\Delta\nu} \quad \text{Gaussian line}$$

$$\tau_c = \frac{1}{\pi\Delta\nu} = \frac{0.318}{\Delta\nu} \quad \text{Lorentzian line} \qquad (5.1\text{-}29)$$

$$\tau_c = 1/\Delta\nu. \quad \text{rectangular line}$$

Thus the order of magnitude does indeed agree with our intuition, and hence the specific definition of (5.1-28) will be used in the future. (See Problem 5-2 for calculation of some typical values of τ_c for some specific sources.)

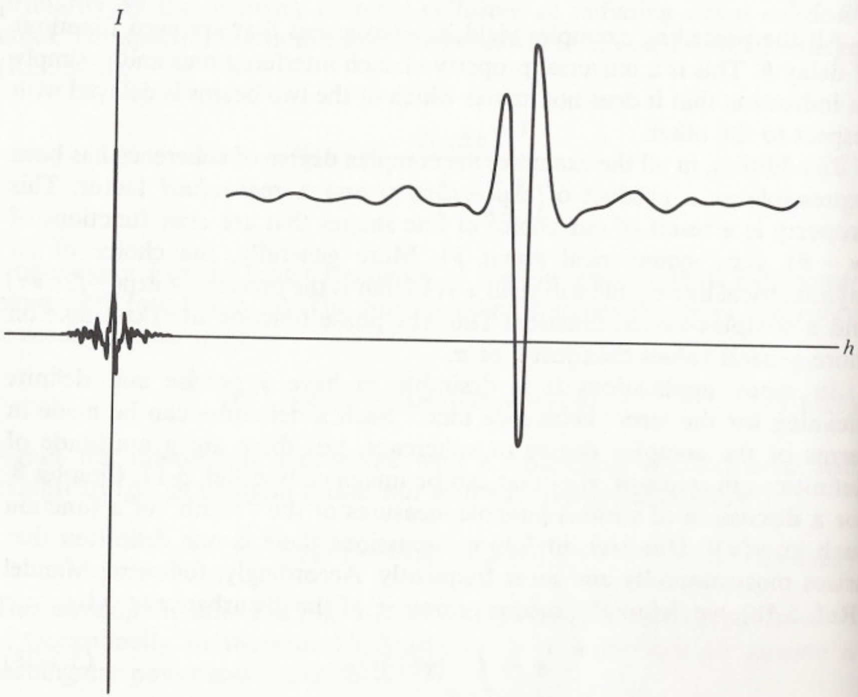

Figure 5-4. Typical midinfrared interferogram plotted with two different horizontal scales. The vertical axis represents detected intensity, and the horizontal axis represents optical path difference. The maximum optical path difference is 0.125 centimeters. (Courtesy of Peter R. Griffiths, University of California, Riverside and the American Association for the Advancement of Science. Reprinted from P. R. Griffiths, *Science*, vol. 222, pp. 297–302, 21 October 1983. Copyright 1983 by the American Association for the Advancement of Science.)

5.1.4 Fourier Spectroscopy

We have seen that the character of the interferogram observed with a Michelson interferometer can be completely determined if the power spectral density of the light is known. This intimate relationship between the interferogram and the power spectrum can be utilized for a very practical purpose. Namely, by measurement of the interferogram it is possible to determine the unknown power spectral density of the incident light. This principle forms the basis of the important field known as *Fourier spectroscopy* (for reviews of this field, see Refs. 5-19 and 5-20).

The general steps involved in obtaining a spectrum by Fourier spectroscopy are as follows. First, the interferogram must be measured. The move-

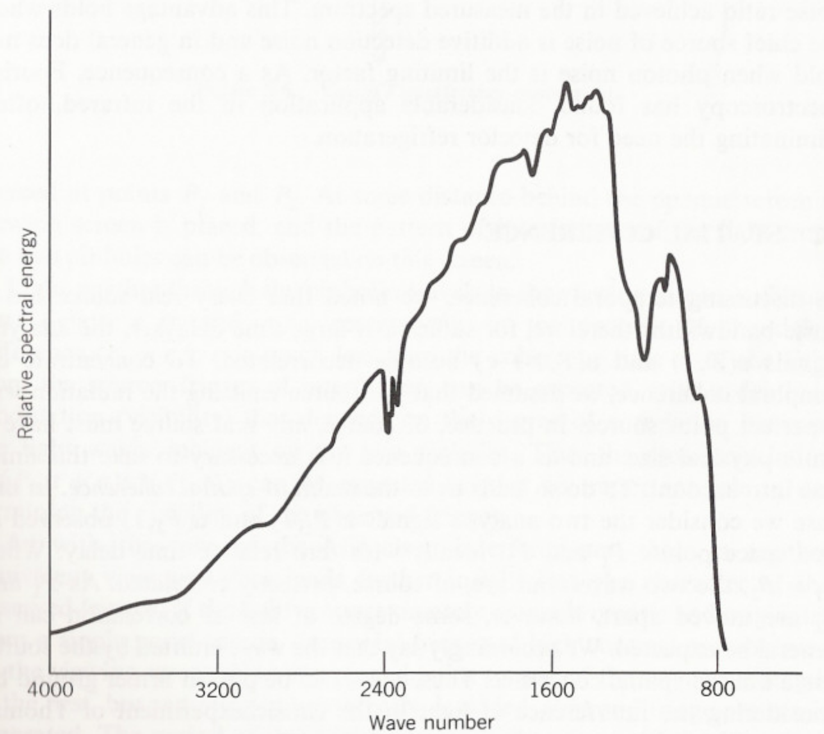

Figure 5-5. The Fourier transform of Figure 5-4, representing the spectrum of the source. The vertical axis represents power spectral density, and the horizonal axis represents optical wavenumber ($2\pi/\lambda$) in inverse centimeters. The resolution achieved is 8 centimeters^{-1}. (Courtesy of Peter R. Griffiths, University of California, Riverside and the American Association for the Advancement of Science. Reprinted from P. R. Griffiths, *Science*, vol. 222, pp. 297–302, 21 October 1983. Copyright 1983 by the American Association for the Advancement of Science.)