Blog Entry © Monday, June 15, 2026, by James Pate Williams, Jr. Filtering a Noisy Signal

Reference: "Numerical Computation 2: Methods, Software and Analysis" © 1997 by Christoph W. Ueberhuber pages 52-53.

We add white noise to the signal:

$$f(t) = 2\ \sin\left(\frac{2\pi t}{500}\right) + \cos\left(\frac{2\pi t}{200}\right) - \frac{1}{2}\ \sin\left(\frac{2\pi t}{50}\right)$$

Then we transform the signal to the frequency domain using a Fourier transform, apply filtering and then use an inverse Fourier transform back to the time domain.

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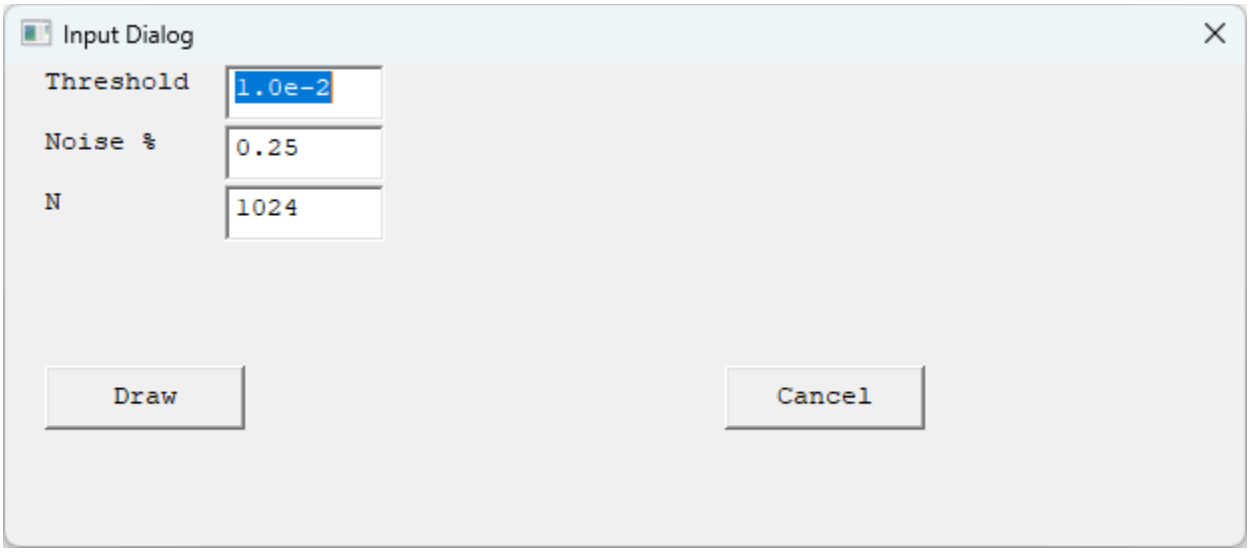

Figure 1Initial Input Dialog

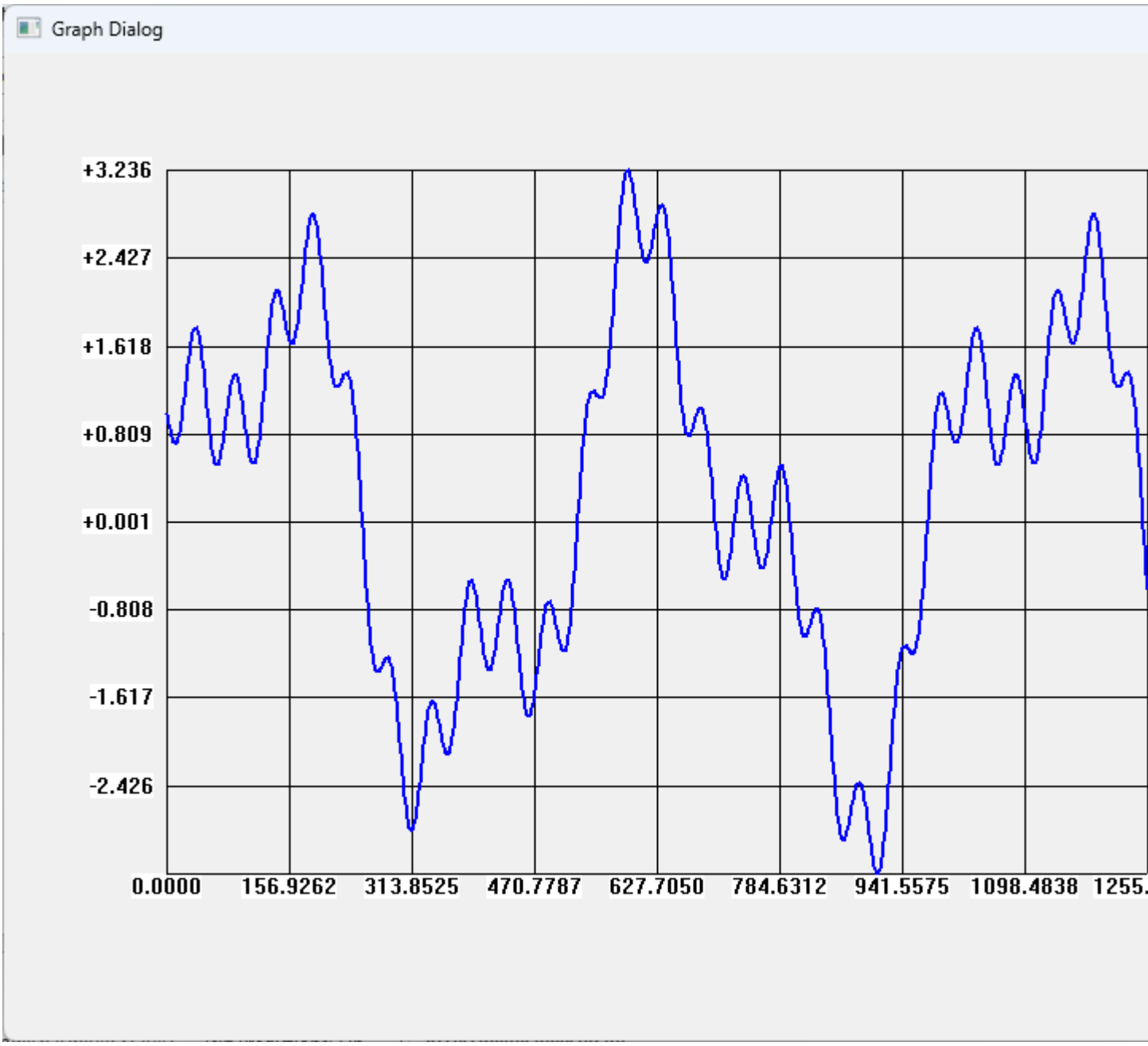

Figure 2 Original Signal

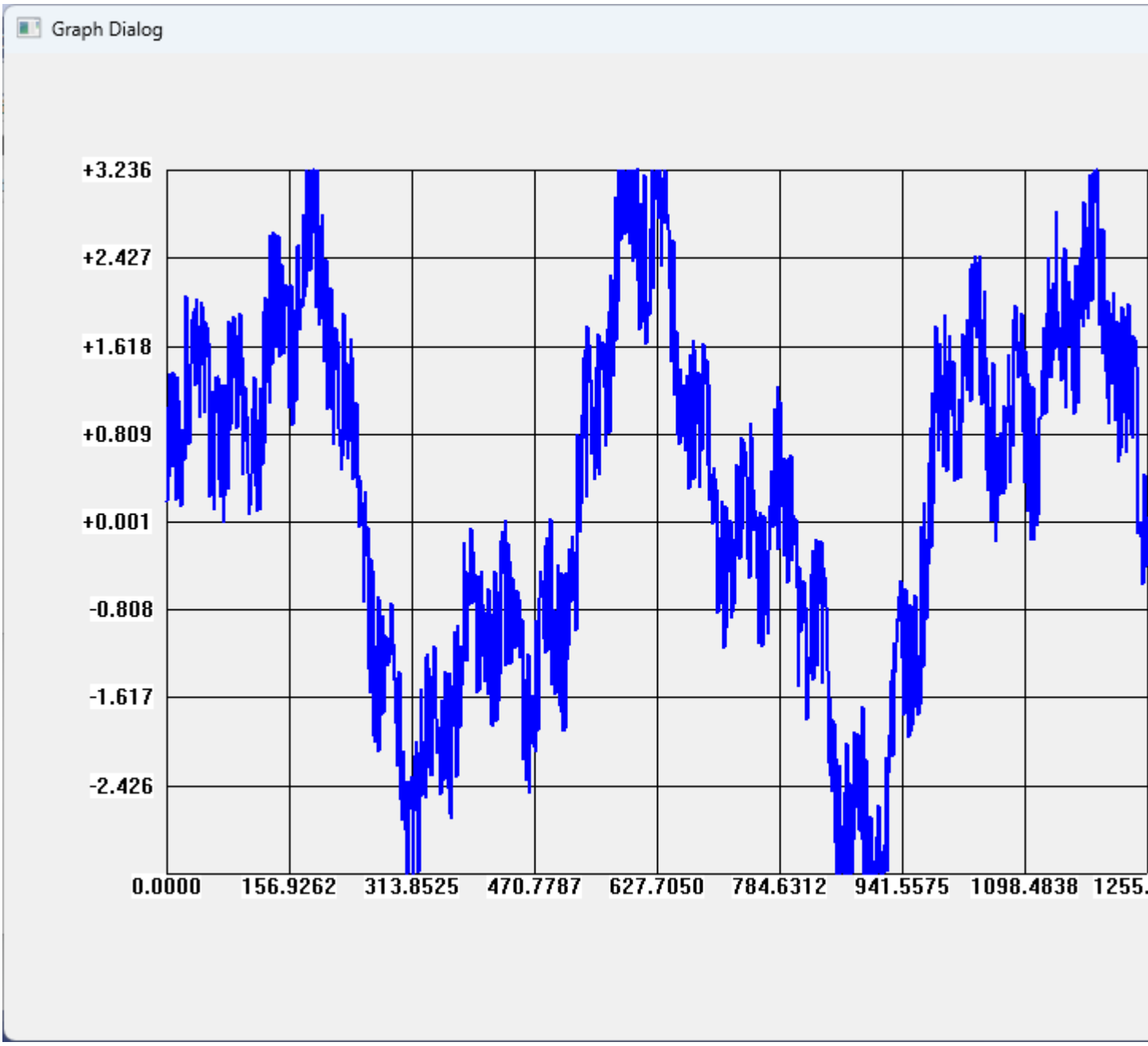

Figure 3 Noisy Signal After Applying 0.25 White Noise

Figure 4 Recovered Signal

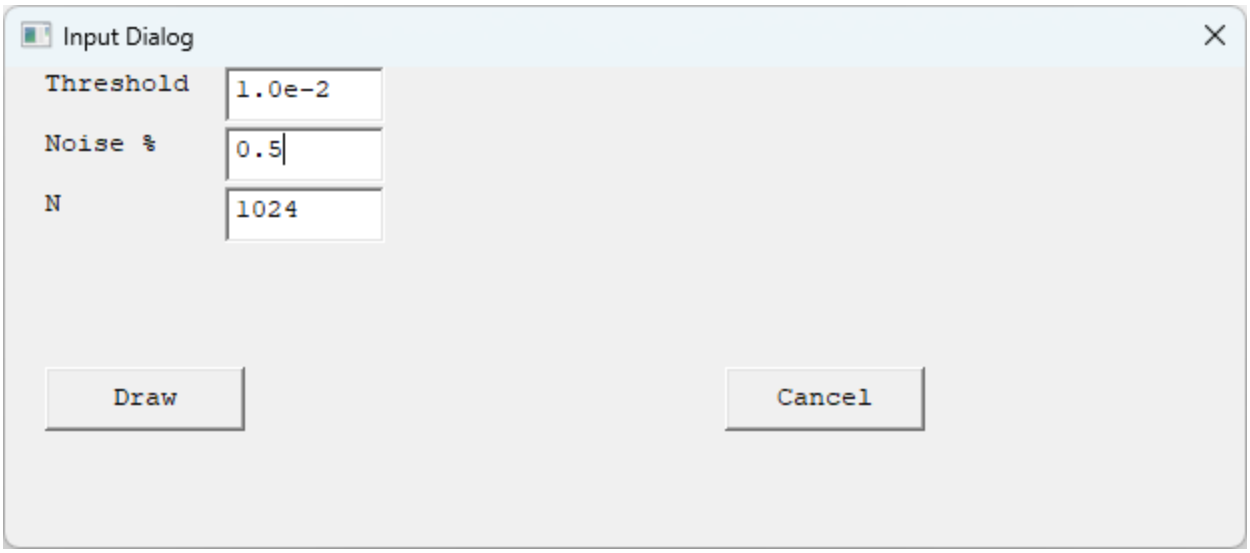

Figure 5 Second Input Dialog

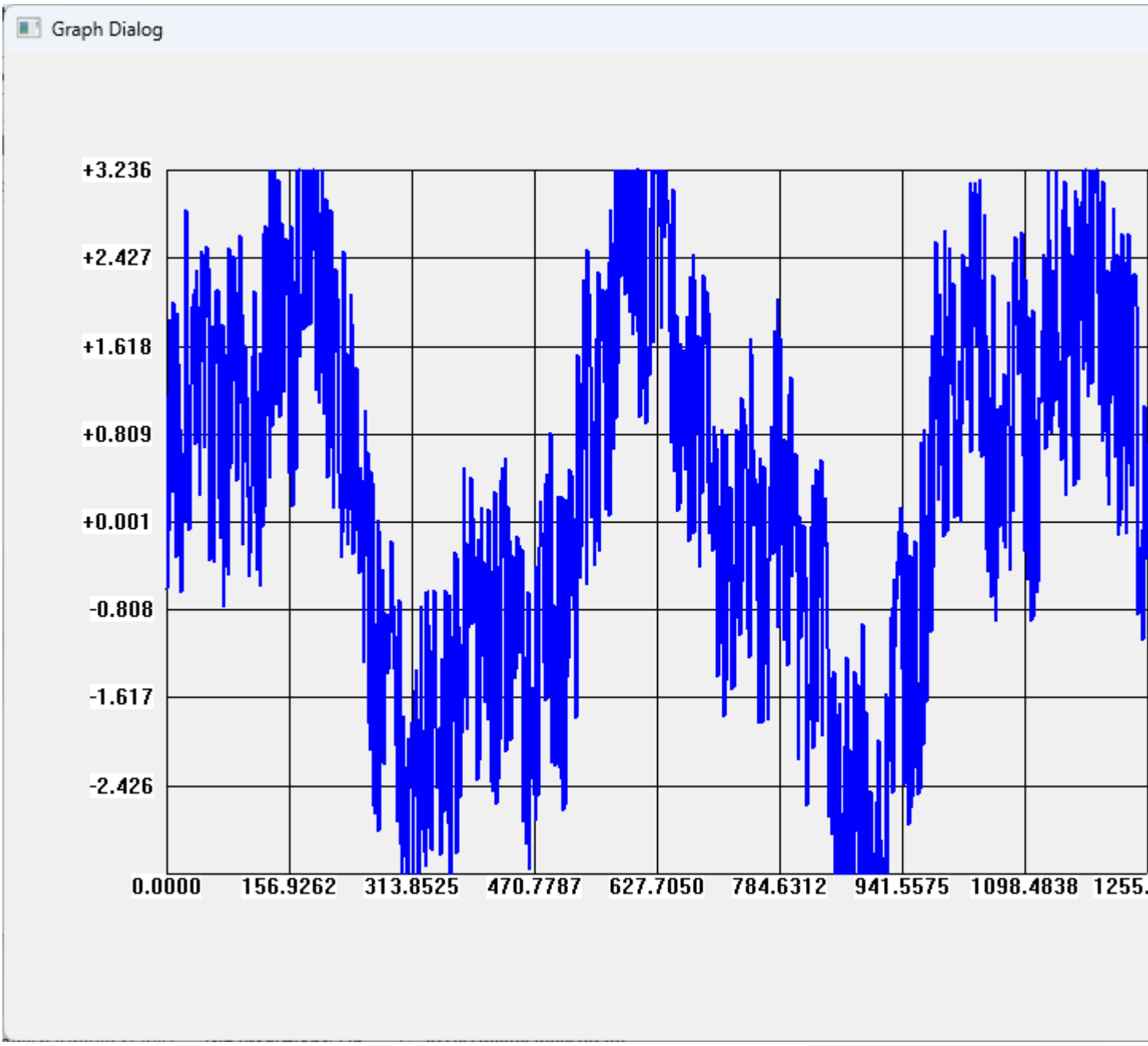

Figure 6 Noisy Signal After Applying 0.5 White Noise

Figure 7 Second Recovered Signal

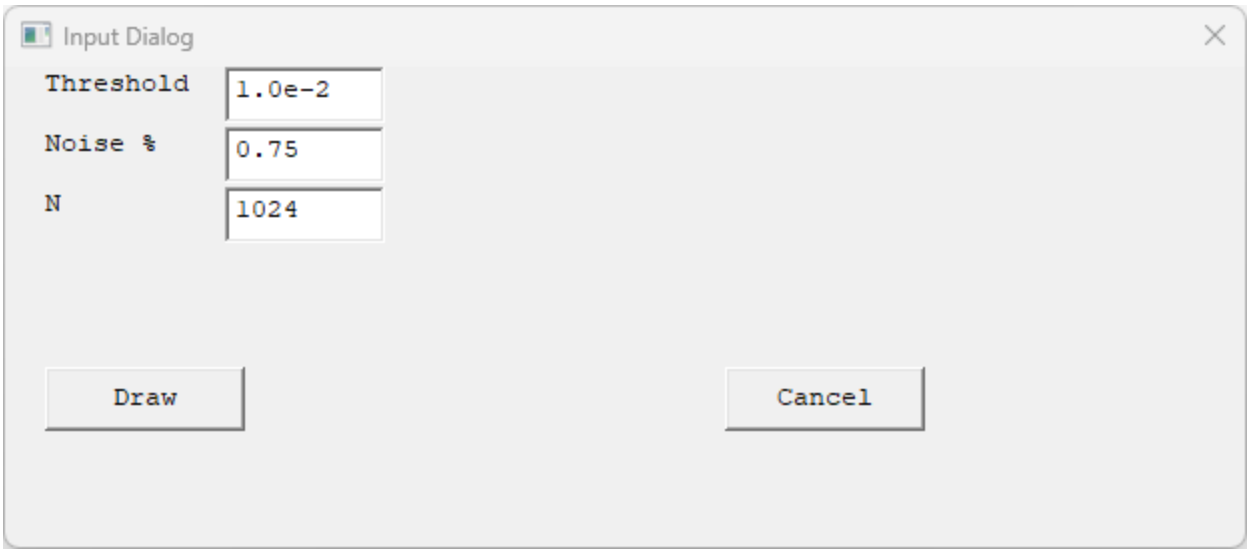

Figure 8 Third Input Dialog

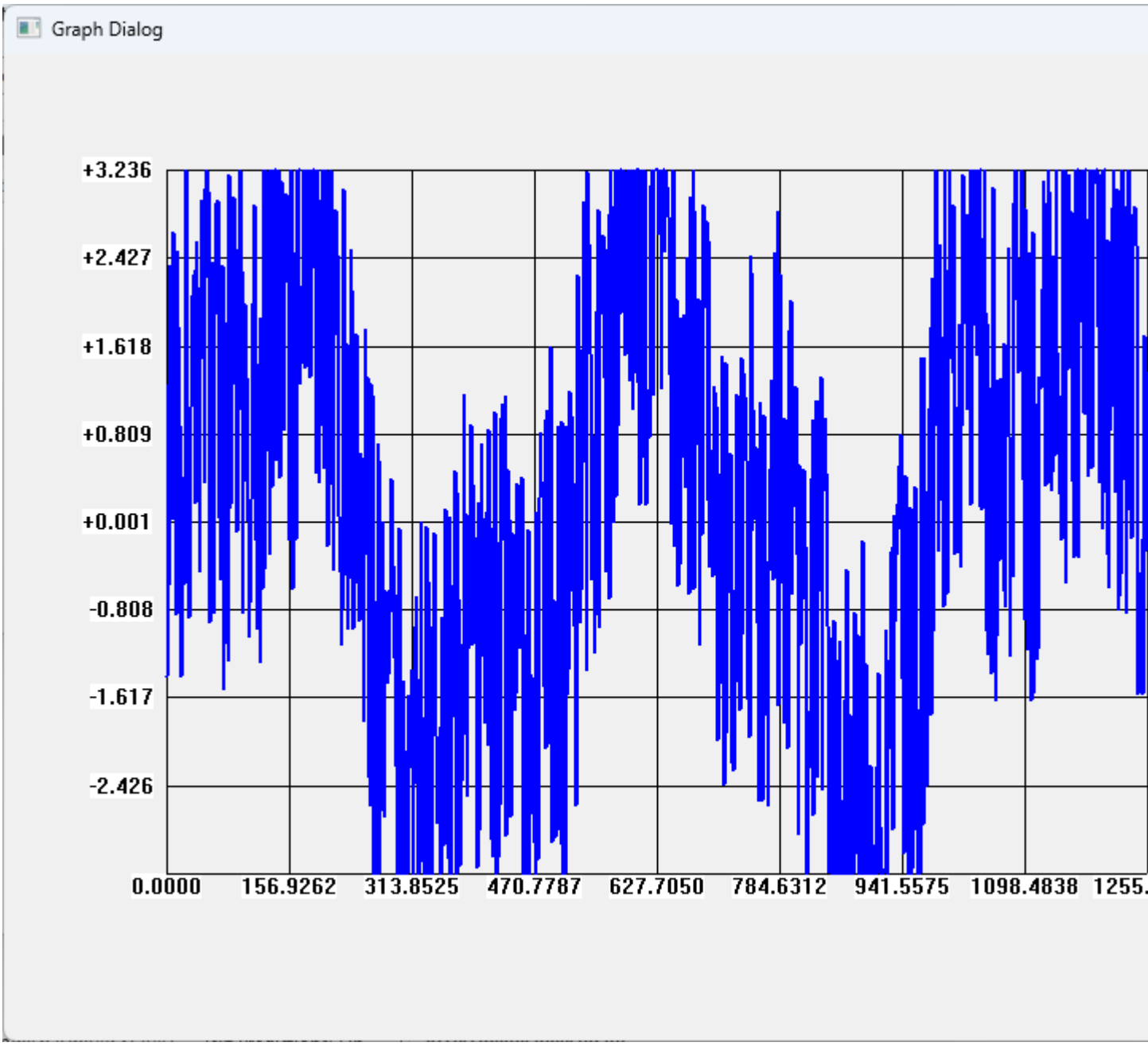

Figure 9 Noisy Signal After Applying 0.75 White Noise

Figure 10 Third Recovered Signal

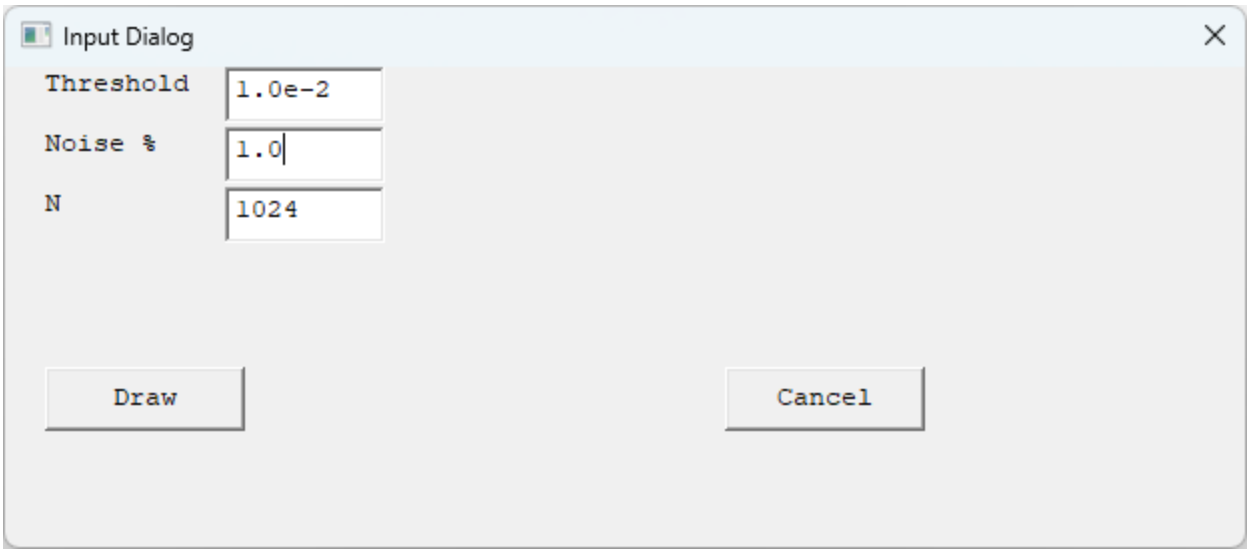

Figure 11 Final Input Dialog

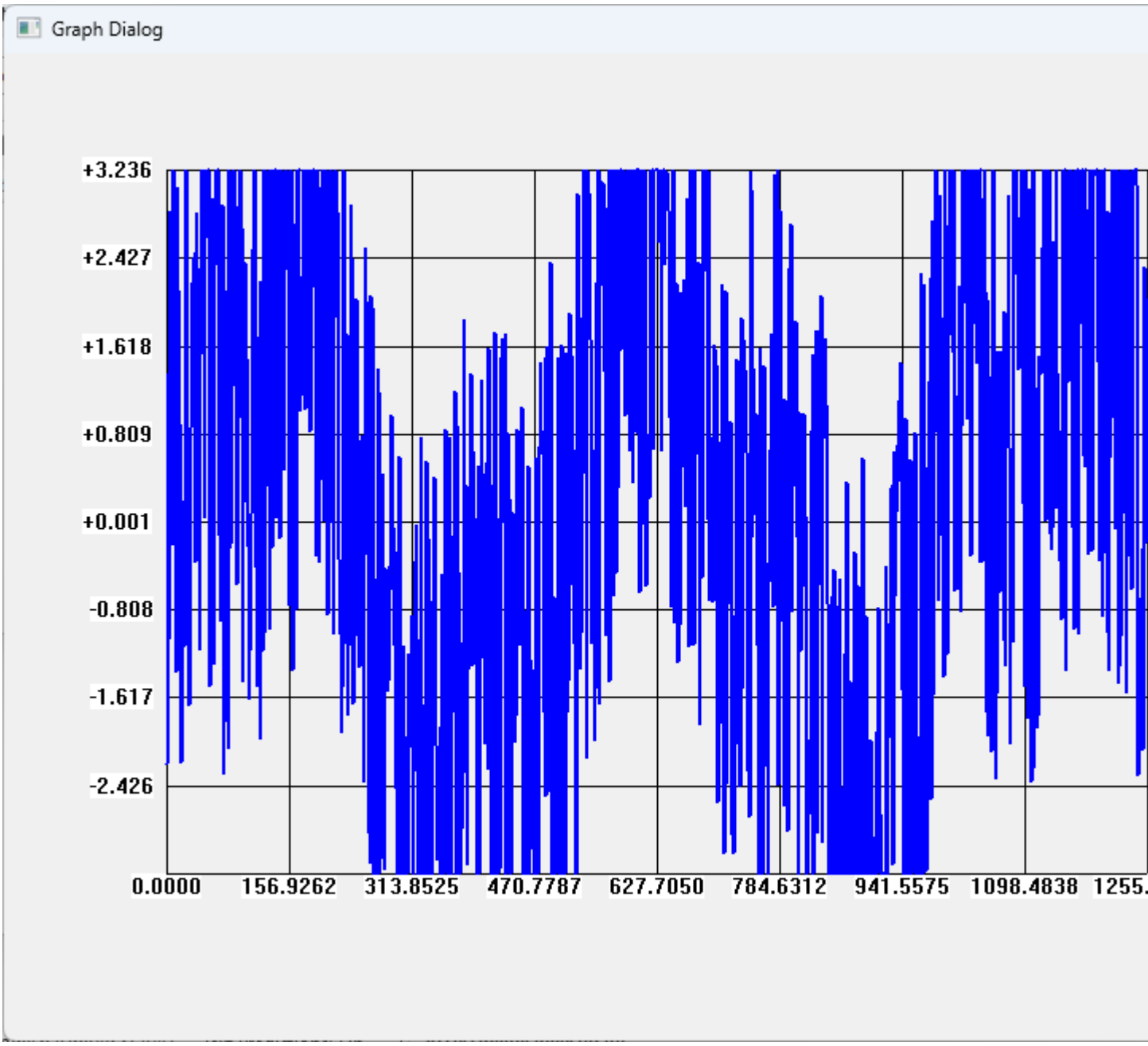

Figure 12 Noisy Signal After Applying 1.0 White Noise

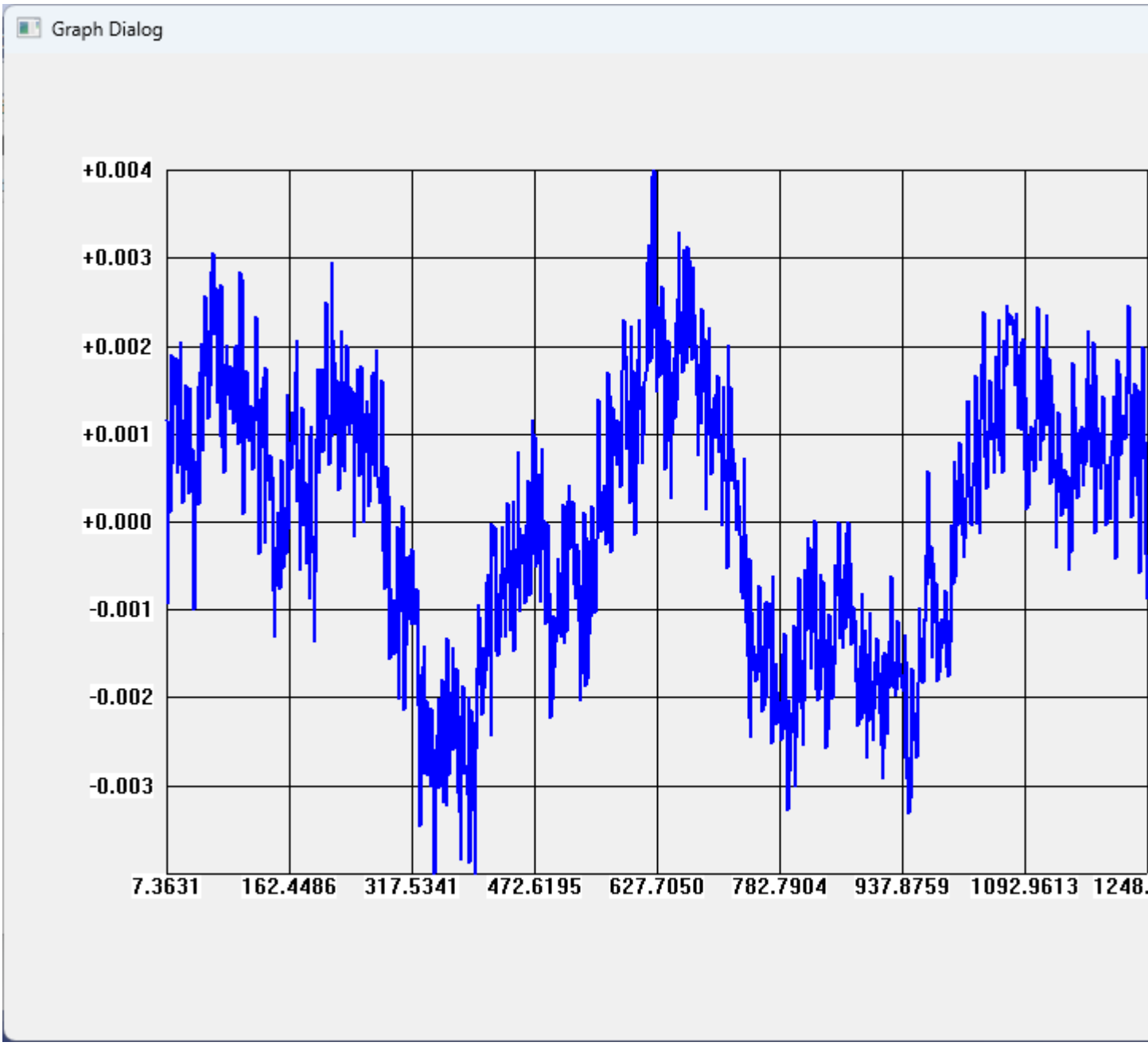

Figure 13 Attempted Signal Recovery