

Fourier transform - convolving sine waves N1AL 6/8/2009

To demonstrate the principle of the Fourier transform, we will create a periodic test signal that we know in advance consists of a single sine wave at the second harmonic. (That is, there are two cycles within each repetition period of the signal.) Then we test it with sine waves of different frequencies by convolving each sine wave with the test signal, which means multiplying them together and taking the average (DC component) of the result.

$i := 0.. 1000$ $p1 := 1000$ The period of the fundamental frequency is 1000 samples.

$$S1_i := \sin\left(2 \cdot \pi \cdot \frac{i}{p1}\right) \quad \text{First harmonic} \qquad S2_i := \sin\left(2 \cdot \pi \cdot \frac{2 \cdot i}{p1}\right) \quad \text{Second harmonic}$$

$$T_i := S2_i \quad \text{Signal to be tested}$$

$$M1_i := S1_i \cdot T_i \quad \text{Test with first harmonic}$$

$$M2_i := S2_i \cdot T_i \quad \text{Test with second harmonic}$$

$$\text{cycles}_i := \frac{2 \cdot i}{p1}$$

