Example C-2: Define a *bipolar* square wave as follows:

$$y(t) = \begin{cases} +1 & \text{for } 0 \le t < T_0/2 \\ -1 & \text{for } T_0/2 \le t < T_0 \end{cases}$$

This square wave can be related to the zero-one square wave of Example C-1 via $y(t) = 2(x(t) - 1/2)$. Subtracting $1/2$ from $x(t)$ will change only the DC value, then multiplying by two will double the size of all the Fourier coefficients. Since the Fourier coefficients of the zero-one square wave are

$$a_k = \begin{cases} 1/2 & \text{for } k = 0 \\ \dfrac{-j}{k\pi} & \text{for } k \text{ odd} \\ 0 & \text{for } k = \pm 2, \pm 4, \ldots \end{cases}$$

the Fourier coefficients $\{b_k\}$ for $y(t)$ are

$$b_k = \begin{cases} 2(a_0 - 1/2) = 0 & \text{for } k = 0 \\ 2a_k = 2\left(\dfrac{-j}{k\pi}\right) & \text{for } k \text{ odd} \\ 0 & \text{for } k = \pm 2, \pm 4, \ldots \end{cases}$$

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