Linear Convolution using Circular Convolution and Vice versa

Performing Linear Convolution Using Circular Convolution Method:

• Zero-Padding: Pad both sequences x[n] and h[n] with zeros to a length of at least 2N-1, where N is the maximum length of the two sequences. This ensures that the circular convolution will not wrap around and introduce artificial periodicity.

• Circular Convolution: Perform circular convolution on the zero-padded sequences.

• Truncation: Truncate the result of the circular convolution to the length N1 +N2-1,where N1 and N2 are the lengths of the original sequences x[n] and h[n], respectively.

Example:

• Consider the sequences x[n] = [1, 2, 3] and h[n] = [4, 5].

• Zero-padding: Pad x[n] to [1, 2, 3, 0, 0] and h[n] to [4, 5, 0, 0].

• Circular Convolution: Perform circular convolution on the zero-padded sequences. The result will be [4, 13, 21, 15, 0].

• Truncation: Truncate the result to [4, 13, 21, 15]. This result is the same as the linear convolution of x[n] and h[n].