REDUCING TRANSIENTS FROM COUPLING CAPACITORS BY MEANS OF WINDOWING FUNCTIONS

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Electrical Impedance Tomography creates an image by measuring the voltage on electrodes attached to the skin after small amounts of currents are applied to them. This current source is connected to the electrodes by means of a DC coupling capacitor. When a sinusoidal input burst is applied to the electrodes the charging of this capacitor produces a transient, which generates an error in the output signal. Presently the input sinusoidal burst signal, having an integral number of cycles, is implemented through a Rectangular window. By implementing different windows, which differ in side lobe and frequency spectrum from that of the Rectangular window, we can reduce the transient effects in the output signals. Specifically, the Blackman, Cosine, and Triangular Windows are chosen based on their different frequency characteristics.

Using the window functions, the sinusoidal input signals are constructed in a way that there are no sudden discontinuities in the burst. Thus the window functions are used to create a ramping up and down effect to the sinusoidal signal. The lengths of the windows are also varied in attempts to find an optimal window size. When the final output magnitude and phase are plotted against the varying input phase, the windowed inputs produce a more constant output than the traditional input. This proposed windowing method produces less phase sensitivity in the output signal. After many simulations the optimal windows of the three window functions are the Cosine and Blackman Windows using a time length of 0.5 ms.