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Ionospheric Dispersion of LFM Pulses. Preliminary report.

Most radars are active sensors, transmitting energy in order to see targets (unlike our own sensors, our eyes, which rely on the sun's energy to see). One advantage radars have for enhancing the detectability of the often weak return signals is that the form of the transmitted signal is known. Radar receiver matched filters exploit this to optimize signal-to-noise ratio.

Detection of some especially demanding radar targets involve both the need for wide bandwidth and propagation through the ionosphere. However, the ionosphere exacts a penalty on wide-bandwidth signals in the form of a frequency-dependent time delay. The result is that the return signal may look quite different from what was transmitted.

A commonly used wide-bandwidth signal involves a train of pulses with linear frequency modulation, or LFM. This talk will look at two ways to deal with ionospheric dispersion of this form of pulse. One is to form the transmit pulse so that the return is LFM. The second is to send out an LFM pulse, and anticipate the form it will have on return. One certain assumptions are accepted, this becomes a nice mathematical exercise. There will also open issues to take away and think about. (Received September 27, 2005)