A Enhanced Dual Function Radar Communications Scheme

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The increasing demand for higher data rates by telecommunications services is placing substantial pressure on the limited radio frequency (RF) spectrum which is in turn leading to strong competition with other essential services such as radar [1, 2]. This competition can be relieved if both systems are allowed to share the spectrum. While spectrum-sensing based spectrum sharing can ease this problem, it does so in an inefficient manner. Cooperative bandwidth as well as waveforms and hardware sharing can not only address the problem of spectral congestion, but can improve performance and efficiency while providing information security in military settings. Dual Function Radar-Communications (DFRC) have thus emerged as a way of achieving this by combining the radar and communications functionalities into the radar platform. This enables the communications function to take advantage of the high quality radar hardware and signal processing [3].

Recently, a new approach for embedding information into frequency-hopped MIMO waveforms was proposed [4]. This scheme operates in the fast time and so is able to achieve a high data rate that is not limited by the pulse repetition frequency. The strategy, referred to as frequency hopping code selection (FHCS), uses the frequency hopping code to carry communication information. This is done in each chip of the pulse, thus giving a significantly higher bit rate. Specifically, the bit rate is given by the number of symbols in the dictionary, which must be truncated to a power of 2. The design of the dictionary is an important problem that was demonstrated in [5] to impact the radar performance. In this talk we will discuss this problem and present a new strategy for dictionary design that improves the radar as well as communications performance.

References

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