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算法研究

GNSS空时最大SINR天线阵抗干扰算法机理分析

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摘要：

未来功率增强背景下，主波束指向有用信号并且将零陷指向干扰的空时联合处理将成为GNSS天线阵抗干扰的主要方式。采用最大信干噪比准则是实现这一目标的方法之一，但随着时域抽头数增加，信号方向的等效滤波器频率响应通带以信号载频为中心将逐渐变窄。传统观点认为这一现象是由BPSK信号频谱峰值位于中心频率处的特性决定的。本文深入分析了这一现象出现的机理，首次推导出等效滤波器响应的峰值位置及零点位置，指出上述现象的根本原因是空时导向矢量仅取中心频率值使得通带集中在这一频率附近。有用信号为M码BOC(10,5)调制信号，其频谱呈多峰特点，且中心频率处频谱值为零，但最大SINR空时处理等效滤波器响应的特性并不因此而改变，从而验证了本文结论。

关键词： 卫星导航系统； 天线阵； 最大信干噪比；机理分析

Analysis for Mechanism of MaxSINR Spatial-timal antijam array Algorithm in GNSS

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Abstract:

With the trend of signals power enhancement, beamforming and nulling STAP processing has become the major method for GNSS antenna arrays anti-jamming. Under the maximum SINR targeted realization, the pass band of equivalent filter for useful signal direction will get narrower when the taps increase. Sophisticated viewpoint is that the character of BPSK spectrum whose maximum value locates at carrier frequency decides this phenomenon. This paper analyzed the underlying mechanism of the phenomenon, derived the frequency position of maximum value and zero value for the first time, and pointed out that the fundamental cause is the narrowband hypothesis.The frequency value of spatial-time steering vector decides the location of maximum value of the equivalent filter. In the end, the conclusion is verified by changing the useful signal to M code BOC(10,5) whose spectrum has two main lobe.

Keywords: GNSS anti-jam array SINR mechanism

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