

论文与技术报告

卫星导航信号MSK-DBOC调制方式研究

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摘要:

针对卫星导航新频段的信号体制设计问题,基于最小频移键控(MSK)调制,提出了一种新的调制方式——最小频移键控-双二进制偏移载波(MSK-DBOC)调制,建立了MSK-DBOC调制的数学模型,推导了MSK-DBOC调制信号的功率谱密度和自相关函数的理论表达式,研究了MSK-DBOC调制和MSK-BOC调制的关系,并分析比较了MSK-DBOC调制信号与相应的MSK-BOC调制信号的跟踪精度、抗干扰能力、兼容性等方面的性能。研究表明,MSK-DBOC调制信号虽然带外损耗较大,但在跟踪精度、抗干扰和兼容性方面具备一定的优势,是一种可行的替代MSK-BOC调制或BOC调制的卫星导航信号调制方案。

关键词: 卫星导航; 最小频移键控调制; 双二进制偏移载波调制; Gabor带宽; 抗干扰品质因数; 频谱分离系数

Study on MSK-DBOC Modulation for GNSS Signal Design

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Abstract:

In order to design high-performance satellite navigation signals for new frequencies, a novel MSK-based modulation MSK-DBOC (Minimum Shift Keying - Double Binary Offset Carrier) was presented. The general mathematical frame of the MSK-DBOC modulation was demonstrated. The theoretical derivations of the power spectral density (PSD) and the autocorrelation function (ACF) of the MSK-DBOC modulated signals were introduced. Then, the relationship between MSK-BOC modulation and MSK-DBOC modulation was analyzed. Finally, comparison between the performances of MSK-DBOC modulated signals and MSK-BOC modulated signals were given. The results indicate that the MSK-DBOC modulation can provide better performance in terms of code tracking accuracy, anti-jamming quality and compatibility, although the out-of-band loss is greater. MSK-DBOC is a feasible modulation for GNSS (Global Navigation Satellite System).

Keywords: satellite navigation minimum shift keying modulation double binary offset carrier modulation Gabor bandwidth anti-jamming quality factor spectral separation coefficient

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