电子与信息学报 2009 31 (12): 2848-2852 ISSN: 1009-5896 CN: 11-4494/TN

论文

运用Super-SVA方法处理频谱不连续调频步进信号

翟文帅, 张云华

中国科学院空间科学与应用研究中心 北京 100190

收稿日期 2008-3-9 修回日期 2009-9-18 网络版发布日期 2009-12-3 接受日期

摘要
调频步进信号是高分辨率雷达中经常采用的一种信号形式。它是线性调频信号和频率步进信号的结合，兼有两者的优点。在实际雷达系统设计中，如果频率步进值能够大于子脉冲带宽，对于以更少的子脉冲数来获得更大的带宽，从而降低目标运动对合成信号质量的影响是非常有帮助的。但此时会出现很高的栅瓣，并导致假目标的出现或者掩盖小的目标。该文利用Super-SVA超分辨方法拓展各子脉冲的频谱从而使合成频谱连续起来，解决了此情况下的栅瓣问题。再利用Super-SVA方法对合成的1维距离像进行处理，则能进一步降低旁瓣。文中给出了计算仿真结果验证了算法的有效性。

关键词 调频步进信号 Super-SVA 栅瓣 旁瓣 超分辨

分类号 TN957.52

Apply Super-SVA to Processing Stepped Frequency Chirp Signal with Bandwidth Gaps

Zhai Wen-shuai, Zhang Yun-hua

Center for Space Science and Applied Research, Chinese Academy of Sciences, Beijing 100190, China

Abstract
Stepped Frequency Chirp Signal (SFCS) is one of usually used signals in high-resolution radar. It is a combination of chirp signal and stepped frequency continuous waveform, and has advantages of the both signals. In the design of real radar system, if the frequency step (?f) can be larger than the bandwidth of sub-chirp (Bm), then it will be very helpful for using less number of sub-chirps to obtain larger bandwidth and reducing the influence of target motion on the quality of synthesized signal. However there will have high grating lobes in range profile when ?f > Bm if without further processing. Here an algorithm is proposed by using Super-SVA to extrapolate the bandwidth of each sub-chirp so as to fulfill the bandwidth gaps between sub-chirps and efficiently eliminate grating lobes. Super-SVA is also applied to the synthesized range profile, then the sidelobes can be further depressed. The simulation results verify the effectiveness of the proposed algorithm.

Key words Stepped Frequency Chirp Signal(SFCS) Super-SVA(Spatially Variant Apodization) Grating lobe Side lobe Super resolution

DOI:

通讯作者

作者个人主页 翟文帅; 张云华