

### DBF-SAR系统1 bit量化的可行性分析

黄杰文<sup>\*①②</sup> 祁海明<sup>①③</sup> 李杨<sup>①②</sup> 禹卫东<sup>①\*</sup>

<sup>①</sup>(中国科学院电子学研究所 北京 100190) <sup>②</sup>(中国科学院研究生院 北京 100039) <sup>③</sup>(微波成像技术国家重点实验室 北京 100190)

### The Feasibility Analysis of One-bit Quantization for DBF-SAR

Huang Jie-wen<sup>①②</sup> Qi Hai-ming<sup>①③</sup> Li Yang<sup>①②</sup> Yu Wei-dong<sup>①\*</sup>

<sup>①</sup>(Institute of Electronics, Chinese Academy of Sciences, Beijing 100190, China) <sup>②</sup>(Graduate University of the Chinese Academy of Sciences, Beijing 100039, China) <sup>③</sup>(The National Key Laboratory of Microwave Imaging Technology, Beijing 100190, China)

摘要

参考文献

相关文章

Download: PDF (641KB) [HTML](#) 1KB Export: BibTeX or EndNote (RIS) [Supporting Info](#)

**摘要** 该文针对DBF-SAR系统数据率巨大的问题,研究了在低信噪比条件下1 bit量化的可行性。提出了两种信号处理方法:(1)回波1 bit量化;(2)回波和距离向匹配滤波器都1 bit量化。通过理论分析和仿真验证,1 bit量化的两种处理方法均能正确反映出目标位置及散射特性,不影响图像空间分辨率,但会产生虚假目标并抬升旁瓣,且虚假目标幅度随着回波信噪比的升高而增大。因此仅在单通道回波信噪比低于-5 dB左右时使用1 bit量化才有意义。

**关键词:** 合成孔径雷达 数字波束形成 扫描接收 1 bit量化 信噪比

**Abstract:** Considering the issue of huge data rate in DBF-SAR system, the feasibility of one-bit quantization under low signal-to-noise ratio condition is analyzed by two methods. In the first method, each sample of echo is quantized into one bit, while in the second, samples of both echo and range matched filter are quantized into one bit. Theoretical analysis and numerical experiments indicate that, both methods can correctly get the positions and scattering characteristic of targets, and keep the spatial resolutions. However, false targets and high side lobe are generated, and false targets become more obvious with higher SNR. Therefore, one-bit quantization is feasible when single channel echo's SNR is lower than -5 dB.

**Keywords:** SAR Digital BeamForming (DBF) Scan-on-receive One-bit quantization SNR

Received 2010-08-31;

**本文基金:**

中国科学院优秀博士论文院长奖获得者专项基金(0813260042)和微波成像技术国家重点实验室基金(9140C1903041003)资助课题

**通讯作者:** 黄杰文 Email: huangjiewen1984@126.com

**引用本文:**

黄杰文, 祁海明, 李杨, 禹卫东. DBF-SAR系统1 bit量化的可行性分析[J] 电子与信息学报, 2011, V33(5): 1107-1113

Huang Jie-Wen, Qi Hai-Ming, Li Yang, Yu Wei-Dong. The Feasibility Analysis of One-bit Quantization for DBF-SAR[J], 2011, V33(5): 1107-1113

**链接本文:**

<http://jeit.ie.ac.cn/CN/10.3724/SP.J.1146.2010.00928> 或 <http://jeit.ie.ac.cn/CN/Y2011/V33/I5/1107>

#### Service

- ▶ [把本文推荐给朋友](#)
- ▶ [加入我的书架](#)
- ▶ [加入引用管理器](#)
- ▶ [Email Alert](#)
- ▶ [RSS](#)

#### 作者相关文章

- ▶ [黄杰文](#)
- ▶ [祁海明](#)
- ▶ [李杨](#)
- ▶ [禹卫东](#)