

### 机载雷达高速空中微弱动目标检测新方法

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## Detection of Fast Moving Dim Targets on Airborne Radar via STAP

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摘要

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**摘要** 该文分析了机载雷达高速微弱空中动目标检测问题,指出直接对总回波数据进行Keystone变换校正存在多普勒模糊的动目标的距离走动时,会导致杂波脊展宽、杂波自由度增加从而降低STAP性能。为了解决这一问题,该文提出了一种新方法,该方法首先进行杂波抑制,然后利用Keystone变换校正目标距离走动,最后对目标距离走动校正后的数据进行常规空时2维波束形成实现目标积累,从而避免目标与杂波模糊数不同时,直接对回波数据进行Keystone变换校正目标距离走动的同时影响杂波分布特性进而降低STAP性能的问题。仿真结果证明了该方法的有效性。

**关键词:** 机载雷达 动目标检测 杂波自由度 Keystone变换 空时自适应处理

**Abstract:** The impacts of Keystone formatting on SATP are first analyzed. Conclusions are obtained from the study that Keystone formatting degrades the performance of STAP by broadening the clutter ridge and increasing the number of clutter degree of freedom. Based on the above reasons, a novel STAP method is proposed for the detection of fast air moving dim targets when the clutter has no range walk, which removes the clutter firstly, then Keystone formatting is applied for the target's range walk compensation, finally, target is accumulated by conventional space-time beamforming. Hence, the effects of Keystone formatting on the clutter distributions and further on the performance of STAP are avoided. Therefore the good detection performance of fast air moving dim target can be achieved. Effectiveness of the new method is verified via simulation examples.

**Keywords:** Airborne radar Moving target detection Degree Of Freedom (DOF) of clutter Keystone formatting Space-Time Adaptive Processing (STAP)

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