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机载MIMO雷达空时自适应杂波对消器

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Space-time Adaptive Clutter Canceller Applied to Airborne MIMO Radar

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摘要

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摘要

针对机载多输入多输出(MIMO)雷达杂波分布呈现空时耦合特性,提出一种空时自适应杂波对消器。利用机载MIMO雷达的脉冲回波数据,构造杂波对消器的系数矩阵。通过空时自适应杂波对消器的预处理,可以有效地抑制杂波,并通过与常规空时处理算法的级联,最终可以有效提高动目标的检测性能。实现了由传统地基雷达杂波对消器向机载运动平台的推广。仿真结果表明,这种自适应杂波对消器不仅适用于正侧视雷达,对于非正侧视雷达也同样适用。

关键词: 机载雷达 MIMO雷达 空时自适应处理 杂波对消器 杂波预滤波

Abstract:

Since the spectrum of the ground clutter in an airborne multiple input multiple output (MIMO) radar is spatially-temporally coupled with each other, a space-time adaptive clutter canceller (STACC) is proposed for suppressing the clutter, which is an extension of the traditional clutter canceller in the ground-based radar to the moving airborne radar platform. By using the clutter echoes within pulses, the coefficient matrix of the clutter canceller is constructed. As a spatial-temporal anti-ground clutter pre-filter before an MIMO space time adaptive processing (STAP) algorithm, the proposed method can significantly suppress the ground clutter and potentially increase the output ratio of signal to clutter plus noise (SCNR). The experimental results demonstrate that the space-time adaptive clutter canceller can enhance the performance of the target detection not only for the side-looking radar, but also for the non-side-looking radar.

Keywords: airborne radar MIMO radar space-time adaptive processing clutter canceller clutter pre-filter

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