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论文与技术报告

基于DEM的机载气象雷达地杂波剔除方法

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摘要:

针对机载气象雷达气象模式地杂波抑制问题，提出利用回波幅度信息的基于数字高程模型（DEM，Digital Elevation Model）的时域地杂波剔除方法。首先利用回波幅度信息对存在雷达回波信号的数据区域进行分割，然后对区域的边界距离单元利用基于DEM的可视性算法分析其触地情况。根据分析结果可知，存在回波信号的区域可分成仅含气象的区域、仅含杂波的区域以及二者相连的区域，其中相连区域还需进行逐距离单元判断确定分界距离单元。将杂波存在的距离单元予以剔除，即可去除地杂波。经实测数据验证，该方法能够根据雷达参数和DEM数据准确地判断杂波所在的距离单元，有效地剔除地杂波。提出的方法仅处理存在回波信号的区域，且不需要对所有的距离单元进行分析，可以大大减小运算量。

关键词： 机载气象雷达 地杂波抑制 DEM 可视性 回波幅度

Ground Clutter Censoring Algorithm for Airborne Weather Radar Employing DEM

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Abstract:

A ground clutter rejection method based on echo amplitude and Digital Elevation Model (DEM) is proposed, which can be used to censor the clutter when airborne weather radar operates in weather mode. For ground clutter suppression of airborne weather radar in weather mode, it proposes ground clutter rejection method base on echo amplitude and Digital Elevation Model. The amplitude information is used to segment the radar initial echo. And then the visibility analysis method based on DEM is used to judge the segmentation edge does touch ground or not. According to the analysis results，these segmentation datum may be only weather, only ground clutter and both of them joined which need to be divided into sub segmentation to identify the boundary of them. The ranges with clutter are edited and rejected, so the suppression is implemented directly in time domain. In virtue of the proposed algorithm, the ranges where the clutter exists can be computed accurately using radar parameters and DEM. The validity of the method is verified by using the measured data. The proposed method only deals with the echo signal above minimum detectable signal. It can greatly reduce the computation.

Keywords: airborne weather radar ground clutter suppression DEM visibility echo amplitude

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