航空学报 » 2011, Vol. 32 » Issue (4) :702-709 DOI: CNKI:11-1929/V.20101029.1748.000

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ISAR非平稳目标成像时间和转速联合估计方法

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Joint Estimation of Suitable Imaging Time and Rotation Velocity for ISAR Maneuvering Target

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摘要 针对逆合成孔径雷达(ISAR)非平稳目标成像,提出基于两特显点相位联合估计成像时间和转速的方法,并得到了转速与相位斜率差(PSD)的解析表达式。首先,基于两个特显点距离单元估计目标转动相位,根据不同时间段转动相位线性度(PLD)选择成像时间。其次,在适合成像的时间段,将成像时间等分成两段,分别提取两段时间内转动相位的斜率。最后,基于两段观测数据PSD估计目标的转速,从而实现目标距离-多普勒(RD)图像的横向定标。仿真和实测数据均验证了本文方法的有效性。

关键词: 逆合成孔径雷达 非平稳目标 成像时间 转速 横向定标

Abstract: In this paper, a method of joint estimation of imaging time and rotation velocity is proposed for inverse synthetic aperture radar (ISAR) maneuvering targets, and the closed expression form of rotation velocity with phase slope difference (PSD) is derived in detail. First, the target rotation phase is retrieved based on two prominent scatterers, and the suitable imaging times are selected as the intervals with high phase linearity degree (PLD). Second, the rotation phase during the suitable imaging time is divided into two half segments, and the PSD between the two half segments is estimated by their difference. Accordingly, the rotation velocity can be obtained based on the PSD, and the range-Doppler(RD) image cross range scaling can be realized by using the estimated rotation velocity. Finally, the effectiveness of the proposed method is verified by using simulated as well as real data.

Keywords: inverse synthetic aperture radar maneuvering target imaging time rotation velocity cross range scaling

Received 2010-07-14;

Fund:

国家自然科学基金 (60971087);空装项目(kj05131)

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引用本文:

彭石宝, 许稼, 夏斌, 冷毅, 向家彬. ISAR非平稳目标成像时间和转速联合估计方法[J]. 航空学报, 2011, 32(4): 702-709.

PENG Shibao, XU Jia, XIA Bin, LENG Yi, XIANG Jiabin. Joint Estimation of Suitable Imaging Time and Rotation Velocity for ISAR Maneuvering Target[J]. Acta

Aeronautica et Astronautica Sinica, 2011, 32(4): 702-709.