算法研究

海上目标航向航速解算新方法

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摘要：

航向航速是海上目标的重要特征，能准确获取目标的航向航速对于海上目标的跟踪和识别具有非常重要的意义。当雷达载体具有较高运动速度时，雷达测量的目标位置信息是非线性的，并且海上目标运动速度慢，在短时间内，受雷达测量精度的限制，目标位置的微小变化量很难精确估算，此时需要建立精度较高的非线性滤波模型，利用卡尔曼滤波方法，提高目标位置信息的估计精度。针对单脉冲雷达，本文提出了一种实时性强，工程上易于实现的海上目标航向航速的解算方法，推导了雷达载体高速运动条件下跟踪目标的滤波方程，采用卡尔曼滤波方法提高了目标位置估算精度。紧密结合工程背景，利用雷达载体的GPS信息和目标测量信息实现了海上目标航向航速的高精度解算。分析了解算数据长度对解算精度的影响，并给出了不同目标选择数据长度的经验公式。最后,通过海上目标在不同场景下的仿真实验，验证了本文方法的有效性和正确性。

关键词： 海上目标； 目标航速； 目标航向；单脉冲雷达

A Novel Sea Target Speed And Course Calculating Method

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Abstract:

Target course and speed are important features of the marine target. Accurately acquiring target course and speed have important significance for target tracking and recognition. When the radar carrier has a high speed, the radar measurement of target position is nonlinear.The sea targets is slow .In a short period, limited by the accuracy of radar, the small changes of target position is difficult to precisely estimate. It need to built a high precision mathematical model, using Kalman filtering method to improving the estimation accuracy of target position. For monopulse radar, this paper presents a strong real-time calculating method of offshore target speed and course. The nonlinear Kalman filter model is derived under the condition of high speed radar carrier. Using radar measurement and the target carrier INS information calculate the speed and course of marine target. The theoretical analysis of the factors of data length affecting the calculating accuracy is proposed, and the empirical formula of data length selection is given based on different target type. Finally, the simulation of the maritime targets in different scenarios verify the correctness of the calculation method.

Keywords: sea target　target speed　target course;Monopulse radar

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