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Tracking with Estimate-Conditioned Debiased 2-D Converted Measurements

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ABSTRACT

This paper describes a new algorithm for the 2D converted-measurement Kalman filter (CMKF) which estimates a target's Cartesian state given polar position measurements. At each processing index, the new algorithm chooses the more accurate of (1) the sensor's polar position measurement and (2) the CMKF's Cartesian position prediction. The new algorithm then computes the raw converted measurement's error bias and the corresponding debiased converted measurement's error covariance conditioned on the chosen position estimate. The paper derives explicit expressions for the polar-measurement-conditioned bias and covariance and shows the resulting polar-measurement-conditioned CMKF's mathematical equivalence with the 2D modified unbiased CMKF (MUCMKF). The paper also describes a method, based upon the unscented transformation, for approximating the raw converted measurement's error bias and the debiased converted measurement's error covariance conditioned on the CMKF's Cartesian position prediction. Simulation results demonstrate the new CMKF's improved tracking performance and statistical credibility as compared to those of the 2D MUCMKF.

KEYWORDS

Tracking, Converted Measurements, Kalman Filter, Unscented Transformation

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References

[1] D. Lerro and Y. Bar-Shalom, "Tracking with Debased Consistent Converted Measurements Versus EKF," IEEE Transactions on Aerospace and Electronic Systems, Vol. 29, No. 3, 1993, pp. 1015-1022.

[2] L. B. Mo, X. Q. Song, Y. Y. Zhou, Z. K. Sun and Y. Bar-Shalom, "Unbiased Converted Measurements for Tracking. IEEE Transactions on Aerospace and Electronic Systems, Vol. 34, No. 3, 1998, pp. 1023-1027.

[3] Z. Duan, C. Han and X. R. Li, "Comments on Unbiased Converted Measurements for Tracking," IEEE Transactions on Aerospace and Electronic Systems, Vol. 40, No. 4, 2004, pp. 1374-1377.

[4] S. Julier, J. Uhlmann and H. F. Durrant-Whyte, "A New Method for the Nonlinear Transformation of Means and Covariances in Filters and Estimators," IEEE Transactions on Automatic Control, Vol. 45, No. 3, 2000, pp. 477-482.

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