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*Nonlinear Filtering – Unscented Kalman filtering with SVD*

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Abstract:

In the Unscented Transformation (UT) used for Unscented Kalman Filter (UKF), we need to compute square roots of covariance matrices to select sigma points, which approximate the covariance information of conditional probabilities. We show by using a 2nd-order model that SVD-based matrix square roots better capture the covariance information than Cholesky decomposition. Simulation results for several discrete and continuous nonlinear systems are also included to show the applicability of the SVD-based UKF algorithm.