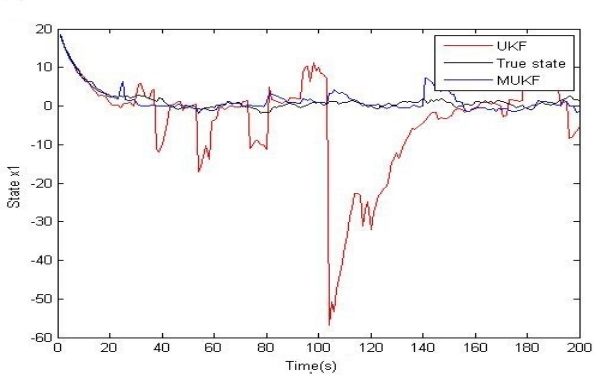

Fig. 4. The true state and estimated state

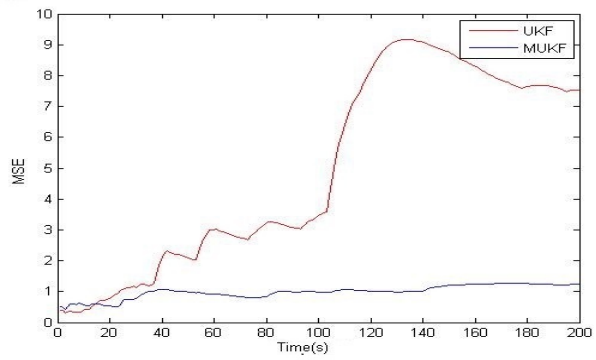

Fig. 5. The mean square error

noisy measurement data. In comparison to the standard UKF, the new algorithm can match arbitrary high-order moments, and so it could provide arbitrary accuracy. Compared to CKF, the new algorithm makes use of general surfaces given by layer function $\mathcal{L}$ instead of spheres in CKF. There are two drawbacks in this new method compared to the traditional UKF and CKF. For the computation of weights, we need the density distribution but the UKF needs only moments information. To obtain the sigma points, we need to solve a polynomial system. This causes the computational cost of the MUKF greater than that of UKF and CKF. However, the examples have shown that the new method still maintains real-time performance. More importantly, the new method provide us a possibility to approximate the distribution in arbitrary degree. As we pursue an high accuracy performance filter, this method could serves as a good alternative or complement to existing methods. For future research, we are investigating how to achieve high accuracy by lower computational cost or less sigma points.

6. ACKNOWLEDGMENT

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