

$NP_{PF} = 3000$ particles. Figure 12 and Figure 13 report the KLD mean value over Scenario I and Scenario II, respectively. The measurement gaps (fixed for scenario I and variable for Scenario II) are considered for all filters, so that the approximation loss for CV-CT-PF and CV-CT-EKF can be observed. Apart from the initial settling phase of the filter, it is evident that the knowledge-based PF technique largely outperforms the EKF counterpart, yielding a much better capability in approximating the asymptotically true posterior PDF.

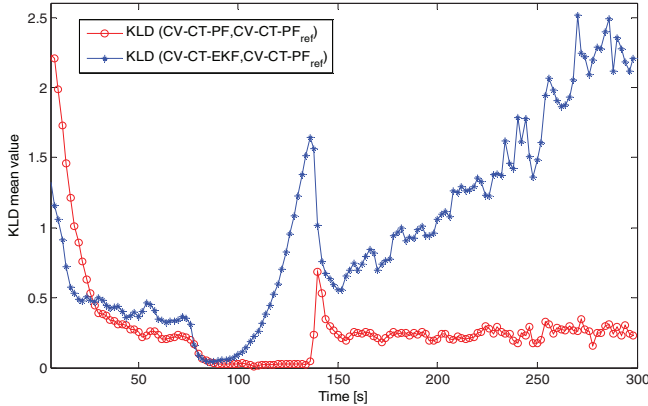


Figure 12. KLD mean value for Scenario I: $KLD(CV-CT-PF, CV-CT-PF_{ref})$ and $KLD(CV-CT-EKF, CV-CT-PF_{ref})$; $\Delta_{GAP} = 60s$ $T = 2s$ and $T_{OBS} = 300s$.

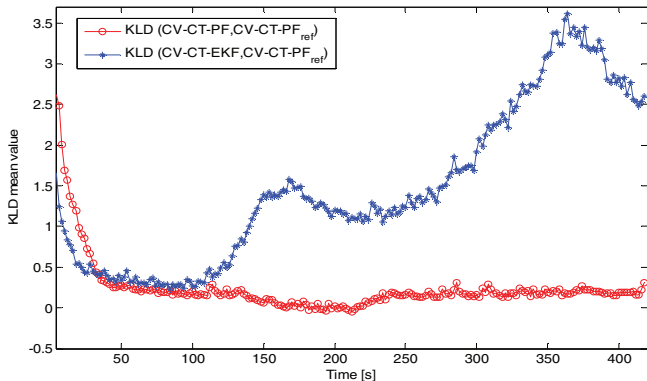


Figure 13. KLD mean value for Scenario II: $KLD(CV-CT-PF, CV-CT-PF_{ref})$ and $KLD(CV-CT-EKF, CV-CT-PF_{ref})$; $\Delta_{GAP} = 72s$, $T = 2s$ and $T_{OBS} = 420s$.

VII. CONCLUSIONS

Two innovative filtering schemes have been proposed in this paper. They implement non-linear Bayesian techniques for target state estimation, and they both exploit a priori vessel route information. The former is derived from the Extended Kalman Filter, whereas the latter is a Particle Filter scheme. The non-sensor information drives the selection of the target dynamical model used in both filters. The performance analysis over simulated scenarios yields a significant improvement coming from the exploitation of the a priori information. In addition, the PF scheme demonstrates increased robustness with respect to the EKF as highly non-linear tracking conditions are experienced.

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