BAYESIAN TRACKING IN UNDERWATER WIRELESS SENSOR NETWORKS WITH PORT-STARBOARD AMBIGUITY

Port-starboard ambiguity is an important issue in underwater tracking systems with anti-submarine warfare applications, especially for wireless sensor networks based upon autonomous underwater vehicles. In monostatic systems this ambiguity leads to a ghost track of the target symmetrically displaced with respect to the sensor. Removal of such artifacts is usually made by rough and heuristic approaches. In the context of Bayesian filtering approximated by means of particle filtering techniques, we show that optimal disambiguation can be pursued by deriving the full Bayesian posterior distribution of the target state. The analysis is corroborated by simulations that show the effectiveness of the particle-filtering tracking. A full validation of the approach relies upon real-world experiments conducted by the NATO Science and Technology Organization - Centre for Maritime Research and Experimentation during the sea trials Generic Littoral Interoperable Network Technology 2011 and Exercise Proud Manta 2012, results which are also reported.