

Real-Time Positioning and Navigation for Ocean Applications Using GPS

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Abstract: GPS technology is now pervasive for positioning and navigation at sea and for ship to shore positioning, but not so for precise applications. We review the use of GPS for precise (cm-level) real-time positioning and navigation (0.01-0.05 degrees) for a variety of ocean applications and platforms. We focus on the precise real-time tracking of autonomous underwater vehicles (AUV's) relative to the mother ship, using instantaneous GPS positioning first successfully applied to the high-rate tracking of earthquake-induced strong motions. This application is challenging since the AUV spends limited time at the surface before and after dives, and since there is usually no real-time access to data from a fixed base station. We then investigate the use of a triad of GPS receivers on the mother ship to compute its attitude and heading using the instantaneous positioning method, and compare the accuracy achievable to existing methodologies.