AISS 23
Autonomous Inland
& Short Sea Shipping

Autonomous Waypoint Sailing with an Alternative PNT System: Practical Experience with VDES R-Mode

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Abstract

Due to reliance of ships on Global Navigation Satellite Systems (GNSS), there is a need for a contingency system that can provide positioning information to ships in case of GNSS being unavailable. One such contingency system called VDES R-Mode is planned to be built on top of the VHF Data Exchange System (VDES). To test the implementation of VDES R-Mode, we used an autonomous unmanned surface vehicle (USV). The USV is equipped with a controller that allows autonomous navigation along predefined waypoints. This controller requires an external position source; usually a GNSS receiver. We replaced this GNSS receiver with a receiver for VDES R-Mode. This setup was tested on the Weßlinger See. Three VDES base stations on the shore of the lake provided ranging signals. The same predefined route was navigated once with GNSS as a position source, and once with VDES R-Mode as a position source. In both cases, a GNSS receiver was also used to record the actual route of the USV.