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Control and navigation of the variable buoyancy AUV for underwater landing and takeoff.

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Summary: Autonomous underwater vehicles (AUVs) can be effectively applied to oceanographic research. However, long-term marine environment measuring is impractical for AUVs because the energy storage is limited. The objective of this paper is to develop the variable buoyancy AUVs with the capacity of landing and bottom-sitting for an extended measuring period and minimum energy consumption. In order to land safely on the expected position on the seafloor, a variable buoyancy system (VBS) has been developed for the AUVs by using water ballast. The ballast operation and landing motion of the AUVs should meet the requirements of landing position/attitude accuracy on the seafloor. The navigation procedure of an AUV for landing and taking-off involves the following steps: deployment; navigation; landing; measuring operation on the seafloor; takeoff; and return navigation. With regard to landing strategy, the bidirectional motion planning method is developed to generate the trajectory for landing on an expected location. The real AUV follows the track which the virtual AUV generates to land on the expected location. A landing controller is designed by using sliding mode fuzzy control (SMFC) technique. The simulation results show that the method performs effectively.

MSC:

93C42 Fuzzy control/observation systems
93C95 Application models in control theory

Cited in **1** Document

Keywords:

navigation; landing; fuzzy controller

Full Text: DOI

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