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UNDERWATER MAINTENANCE STATION OF HYBRID UNMANNED UNDERWATER VEHICLE MONITORING SYSTEM FOR OIL AND GAS PRODUCTION COMPLEX

V.V. Kostenko, A.Yu. Bykanova, D.N. Mikhaylov, A.V. Remezkov

The use of support vessels significantly increases the cost of monitoring objects of underwater production complexes (UPC), and the presence of a cable communication line significantly limits the possibility of using remote-controlled uninhabited underwater vehicles (ROV), which is reduced to zero in conditions of continuous ice coverage of the work area. An obvious alternative to the use of ROVs are autonomous uninhabited underwater vehicles (AUVs), equipped with equipment for conducting contact work with monitoring objects and communicating with the shore control post. At the same time, the necessary autonomy for the use of such hybrid autonomous uninhabited underwater vehicles (HAUVs) can be ensured by a network of bottom stations equipped with systems for contactless charging and information exchange with the shore UPC control post. The work proposes the concept of an underwater service station (USS) for a HAUV, which allows, in long-term underwater deployment conditions, to use the device not only in an autonomous mode, but also in a remote control mode from a shore control post. A model for using the station for its intended purpose and the composition of the equipment necessary for its implementation have been determined, the design of the technical solution of the station has been presented, determined taking into account the features of installation on a complex bottom surface and the requirements for docking the HAUV for contactless charging and information exchange, including in the mode of remote control from the SCP. Basic technical solutions for the USS have been developed that provide automatic adjustment of the horizontal position of the docking unit, reliable docking and holding of the HAUV charging and information exchange terminals, and control of the vehicle's pointing process using a set of rotary video cameras with lamps and a sector-view sonar. Algorithms for interaction between the station and the HAUV have been developed for autonomous and controlled via optical communication cable operating modes of the vehicle.

Keywords: underwater service station, hybrid AUV, bottom-based, automatic docking, underwater production comple.

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About the authors

KOSTENKO Vladimir Vladimirovich, Ph.D., leading researcher, head laboratory of actuating devices and remote control system
Federal State Budgetary Institution of Science M.D. Ageev Institute of Marine Technology Problems Far East Branch Russian Academy of Sciences
Address: 5a, Sukhanov Str., Vladivostok, 690950
Research interests: underwater robotics, motion control systems for autonomous and remote-controlled underwater robots, propulsion and steering systems, dynamic models, underwater tethering systems.
Phone: +7 (423) 243-24-16
E-mail: kostenko@marine.febras.ru, kosten.ko@mail.ru
SPIN-код: 2310-3141
ORCID: 0000-0002-3821-3787
Reserch ID: AAF-6399-2021
Scopus ID: 57189036440

BYKANOVA Anna Yurievna, Ph.D., Senior Researcher of actuating devices and remote control system laboratory
Federal State Budgetary Institution of Science M.D. Ageev Institute of Marine Technology Problems Far East Branch Russian Academy of Sciences
Address: 5a, Sukhanov Str., Vladivostok, 690950
Research interests: underwater robotics, unmanned underwater vehicle, manipulation device, docking system
Phone: +7 (423) 243-24-16
E-mail: Vladianna@mail.ru
ORCID: 0000-0002-3040-1345

MIKHAILOV Denis Nikolaevich, senior research scientist of actuating devices and remote control system laboratory
Federal State Budgetary Institution of Science M.D. Ageev Institute of Marine Technology Problems Far East Branch Russian Academy of Sciences
Address: 5a, Sukhanov Str., Vladivostok, 690950
Research interests: underwater robotics, hardware and software platforms, propulsion and steering systems and power supply systems for autonomous and remote-controlled underwater robots
Phone: +7 (423) 243-24-16
E-mail: denmih@marine.febras.ru
SPIN-код: 1940-6170
ORCID: 0000-0002-2427-8459
Reserch ID: P-4784-2017
Scopus ID: 57215280371

REMEZKOV Andrei Vladimirovich, Advisor to Vice President for Research
State Autonomous Education Institution of Higher Education
Far Eastern Federal University
Address: FEFU Campus, 10 Ajax Bay, Russky Island, Vladivostok, 690922, Russia
Research interests: underwater robotics, unmanned underwater vehicle, autonomous and remote-controlled underwater robots.
Phone: +7 (914) 705-73-90
E-mail: remezkov.av@dvfu.ru
ORCID: 0000-0002-2491-008X