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Aspects Regarding the Structural Behaviour of Autonomous Underwater Vehicle for Emergency Response

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Abstract : The purpose of this article is to present an analytical-numerical study on the structural behavior of a sunken autonomous underwater vehicle (AUV) for emergency intervention. The need for such a study was generated by the key objective of the ERL-Emergency project. The project aims to develop a system of collaborative robots for emergency response. The system consists of two robots: unmanned ground vehicles (UGV) on tracks and the second is an AUV. The system of collaborative robots, AUV and UGV, will be used to perform missions of monitoring, intervention, and rescue. The main mission of the AUV is to dive into the maritime space of an industrial port to detect possible leaks in a pipeline transporting petroleum products. Another mission is to close and open the valves with which the pipes are provided. Finally, you will need to be able to lift a manikin to the surface, which you can take to land. Numerical analysis was performed by the finite element method (FEM). The conditions for immersing the AUV at 100 m depth were simulated, and the calculations for different fluid flow rates were repeated. From a structural point of view, the stiffening areas and the enclosures in which the command-and-control elements and the accumulators are located have been especially analyzed. The conclusion of this research is that the AUV meets very well the established requirements.

Keywords : analytical-numerical, emergency, FEM, robotics, underwater
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