Underwater glider design based on dynamic model analysis and prototype development

基于动力学模型分析的水下滑翔机设计与样机研制

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- A coastal 200 m depth underwater glider, which can serve as an ocean observatory platform operating in the East China Sea, is developed based on *dynamic model analysis*
  - *Steady flight equilibrium analysis* gives the varied range of moving mass location for pitch control and the varied vehicle volume for buoyancy control
  - *Stability analysis* discusses the relationship between the stability of glider motion and the location of glider wings and rudder by root locus investigation of glider longitudinal- and lateral-directional dynamics, respectively
  - There is a *tradeoff* between glider motion stability and control authority according to the specific glider mission requirements
- Theoretical analysis provides guidelines for vehicle design, based on which the development progress of the *Zhejiang University (ZJU) glider* is presented
  - The performances of glider *key functional modules* are validated by pressure tests individually
  - The results of preliminary *pool trials* indicate that the ZJU glider functions well in water and can serve as a sensor platform for ocean sampling

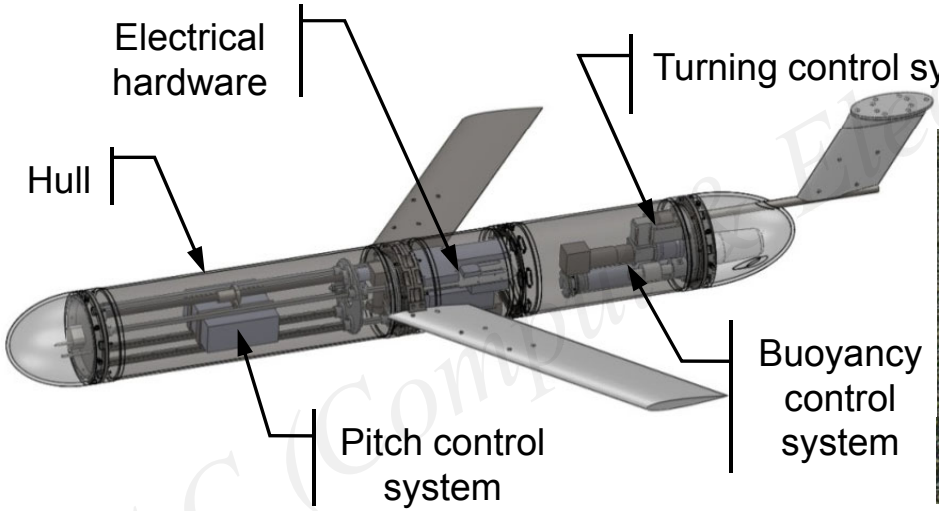
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Development and trial progress of the ZJU glider

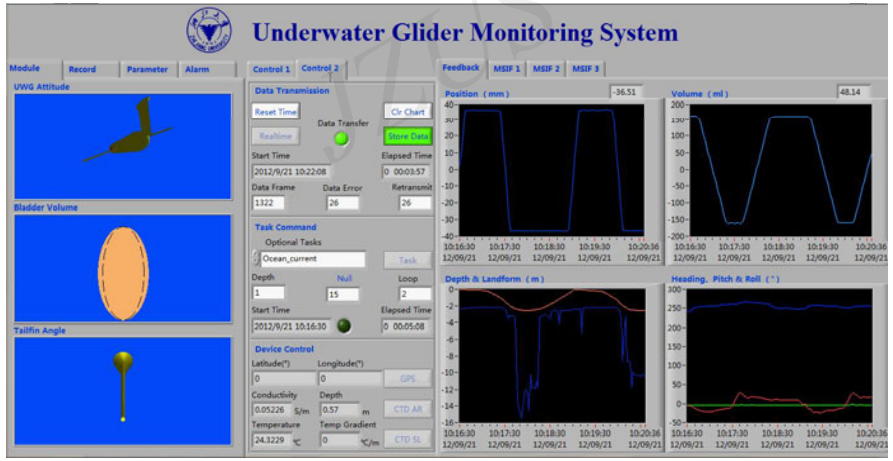
- The wall thickness of the *hull* was sized using yield and buckling criteria. The strength and sealability of the hull was tested in the hyperbaric chamber.



- The feasibility of the *buoyancy control system* was simulated by AMESim software firstly. The performance of the system was validated in a specially designed small hyperbaric chamber.







- Pool trial



