H∞ Robust Fault-Tolerant Controller Design for an Autonomous Underwater Vehicle's Navigation Control System(PDF)

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Title: H∞ Robust Fault-Tolerant Controller Design for an Autonomous Underwater Vehicle's Navigation Control System

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关键词： AUV; navigation control; robust H∞ fault-tolerant control; gain variations; LMI

分类号： -

DOI： -

文献标识码： A

摘要： In order to improve the security and reliability for autonomous underwater vehicle (AUV) navigation, an H∞ robust fault-tolerant controller was designed after analyzing variations in state-feedback gain. Operating conditions and the design method were then analyzed so that the control problem could be expressed as a mathematical optimization problem. This permitted the use of linear matrix inequalities (LMI) to solve for the H∞ controller for the system. When considering different actuator failures, these conditions were then also mathematically expressed, allowing the H∞ robust controller to solve for these events and thus be fault-tolerant. Finally, simulation results showed that the H∞ robust fault-tolerant controller could provide precise AUV navigation control with strong robustness.

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备注/Memo: -

更新日期/Last Update: 2010-03-11