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基于模糊推理的舰载机进舰过程安全性仿真分析

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Carrier-based Aircraft Landing Process Safety Simulation Analysis Based on Fuzzy Inference

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摘要

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摘要

舰载机进舰过程复杂,驾驶员对舰载机的控制是影响进舰安全的重要因素,驾驶员操作的偏差受到人员自身状态、环境状态以及设备(舰载机)状态的综合影响。以国外某型舰载机为例,提出了基于模糊推理的舰载机进舰过程安全性建模与仿真方法。考虑舰载机进舰过程中驾驶员控制的不确定性,分析了引起驾驶员不确定性的人-机-环因素,基于模糊推理建立不确定因素引起的驾驶员控制偏差模型,并在此基础上建立了舰载机进舰过程安全性仿真模型。通过仿真分析明确危险模式、危险程度以及危险发生的时刻点等关键因素的影响程度,为进一步保证舰载机进舰安全提供基础。

关键词: 系统安全 舰载机 进舰 安全性仿真 模糊推理

Abstract:

Carrier-based aircraft landing is a complex process, its safety largely depending on the control deviation of the pilot which is again influenced by a combination of the state of the physical condition of the pilot, the environment and the equipment (carrier-based aircraft). Taking a certain type of foreign carrier-based aircraft as an example, this paper provides a method of carrier-based aircraft landing process safety modeling and simulation based on fuzzy inference. The uncertainty of pilot control during the process of carrier-based aircraft landing is considered, and this method analyzes the influencing factors of the uncertainty from the point of view of human-machine-environment. A hazard model is presented based on fuzzy inference, on the basis of this model, a safety simulation model of the landing process is proposed. And then the degree of influence of key factors, such as hazard mode, criticality, and hazard occurrence time, etc., is determined from simulation analysis which lays the foundation for safe carrier-based aircraft landing.

Keywords: system safety carrier-based aircraft landing safety simulation fuzzy inference

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