

Research on Key Technologies for Autonomous Take-off and Landing of Large Aircraft

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Abstract

The construction of smart civil aviation, characterized by the application of new generation information technology, is gradually becoming the leading trend of the new round of aviation development. As one of the key technologies to enhance the autonomy, intelligence and economy of aircraft, the maturity of fully automatic takeoff and landing technology for civil large aircraft is steadily improving. The existing automatic landing of civil aircraft relies on the ground precision guidance system, e.g. ILS/GLS/MLS, which has the problems of high maintenance cost and insufficient autonomy. This report adopts the multi-source information fusion method with vision as the main navigation source, comprehensively utilizes airborne navigation sources such as multi-band cameras, inertial navigation systems, dual-frequency multi-constellation satellite receivers and radio altimeters, proposes an inertial/visual/DFMC/RA multi-source fusion navigation architecture based on distributed fusion, and carries out research on high-performance and robust visual runway detection based on artificial intelligence, INS/DFMC combined navigation design and evaluation, inertial/visual combination and integrity design, RA-assisted vertical navigation enhancement and other methods. It has achieved high-precision, high-integrity, high-safety and high-availability navigation capabilities, provided navigation guidance capability support for fully automatic takeoff and landing, enhanced the safety and operational efficiency of large aircraft, and helped to improve the market competitiveness of domestic large aircraft.



Yang Weiping, born in 1972, a doctor of engineering, a researcher, and graduated from the major of Optoelectronic Engineering at BUAA. He is currently the Director of GNC Industrial Machinery Division, Director of FACRI, Vice President of CSIT, Standing Director of CSAA; Deputy director of GNC Branch, CSAA, Deputy director of Electromechanical, Human & Environmental Engineering Branch, CSAA.

Yang Weiping has achieved independent research and development of aviation navigation systems, making outstanding contributions to aviation navigation guidance and control in China. Yang has won the National Science and Technology Progress Award four times, Provincial and Ministerial-Level Science and Technology awards fifteen times and published more than 20 papers.