

Exploration and Reflection on Aircraft All-Electric Brake Control Technology

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Abstract

With the implementation of the national "dual carbon" strategy and the development of international green aviation concepts, the design concept of civil aircraft is undergoing transformation and upgrading from "weight reduction and drag reduction" to "energy conservation, emission reduction, noise reduction, circulation, and health". Electric aviation is one of the important ways to achieve high-end, intelligent, and green development in the aviation industry. As a key core equipment to ensure the safety of aircraft landing, takeoff, taxiing, and braking, the all electric braking system has the advantages of high safety, strong reliability, good dynamic performance, and easy maintenance. The related key technologies are one of the main development directions for domestic large aircraft in the future. Currently, aircraft have higher requirements for safety and comfort, and the service environment is more complex, posing greater challenges to the reliability of anti-skid brake control and adaptability to complex environments. This report mainly introduces the key technology research and prospects of aircraft electric braking systems. The modeling of an all-electric brake system, high reliability anti-skid control and optimization, efficient collaborative turning of multiple wheels, development of experimental platforms, and other key technologies are elaborately introduced combined with the research results of our team. Finally, prospects and reflections on the future development trends of all-electric brake systems are presented.



Weihua Gui is an Academician of the Chinese Academy of Engineering. He received his the B.Eng. degree in Electrical Engineering and the M.Eng. Degree in Industrial Automation from Central South Institute of Mining and Metallurgy, P. R. China, in 1976 and 1981, respectively. From 1986 to 1988 he was a Visiting Scholar at Universität-GH-Duisburg, Germany. Since 1991, he has been a Full Professor at Central South University. He was the director of the Academic Committee of Central South University, director of the Engineering Research Center for Nonferrous Metallurgical Automation of the Ministry of Education, Vice Chairman of the Chinese Association of Automation (CAA), Vice Chairman of the Nonferrous Metals Society of China (NFSOC), and Chairman of the Process Control Professional Committee of CAA. His main research interests include intelligent control systems and their applications. He has won three Second Prizes of the National Science and Technology Progress Award, one Second Prize of the National Technological Innovation Award. He is the winner of the Science and Technology Progress Award of the Ho Leung Ho Lee Foundation, National Model in Teaching and Education, National Model Teacher, National Excellent Scientific and Technological Worker, Hunan Guangzhao Science and Technology Award, China Process Control Lifetime Achievement Award, Yang Jiachi Science and

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