TRACK 1: STRUCTURES / AERODYNAMICS

"DEVELOPMENTS IN UAV AERODYNAMICS AT DSO NATIONAL LABORATORIES"

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ABSTRACT

DSO National Laboratories plays an active role in the development of indigenous UAVs, including the joint development of the Skyblade III and IV UAVs with ST Aerospace. The UAV Aerodynamics Group at DSO engages in the preliminary sizing and design, analysis through computational methods, wind tunnel testing of such aircraft and its sub-systems, as well as the prediction of flight performance. This paper provides an overview of the work, with some specific examples as discussed below.

In the latest research and development, the team successfully validated the design and use of winglets to improve cruise lift-to-drag ratio, thereby extending the endurance of the UAV. In addition, the team pioneered the investigation of rain effects on the aerodynamics of UAVs. Through wind tunnel testing and ongoing analytical studies, the team has created a preliminary model in the prediction of effects of rain on UAV performance. Another application of the team's aerodynamics know-how is in the use of fuselage surface-mounted static ports as part of the UAV anemometry system.

Ongoing research themes include propeller analysis and design for higher propeller efficiencies, the accurate prediction of aircraft dynamic derivatives for better flight control design, as well as the accurate measurement of flight test parameters to aid system verification.

BIOGRAPHY OF SPEAKERS

Mr Chen Weisheng, Senior Member of Technical Staff, graduated with his BSc and MSc in Aerospace Engineering from the University of Michigan, Ann Arbor. He is familiar with UAV development from preliminary sizing through to wind tunnel testing. His main interest is in the domain of external vehicle fluid dynamics, including airfoil and propeller design.

BIOGRAPHY OF SPEAKERS

Ms Lim Kai Qi, Member of Technical Staff, graduated with her BEng in Aerospace Engineering from Nanyang Technological University, Singapore. She works on UAV design and aerodynamic analysis pertaining to stability and control, and flight.

Mr Teo Qing Ren, Member of Technical Staff, graduated with his BEng in Aerospace Engineering from Nanyang Technological University, Singapore. His current focus is on UAV design and aerodynamic analysis.