

# **Aerospace Europe Conference 2023**

## **Joint 10<sup>th</sup> EUCASS – 9<sup>th</sup> CEAS Conference**

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Abstract #XXX (to be filled by the organizers)

Preferred Topics: PROPHY / SUSTAV / UAVFUT

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Type: Oral

Status of corresponding author: Regular

For student corresponding author: student member of one of the following:

3AF / AAAR / AIAE / AIDAA / CzAeS / DGLR / FTF / NVvL / PSAA / RAeS / SVFW / EUROAVIA

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### **Title**

**Flight efficiency of multirotor, new definitions and function sensitivity in-flight tests.**

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### **Abstract**

Unmanned Aerial Vehicles (UAV) are becoming an increasingly usual part of our environment. Especially UAVs in a multi-rotor configuration are proving to be a very useful means of transport due to their vertical take-off and landing capabilities. The constantly increasing number of applications, and the more practical nature of these applications, is challenging the developers of unmanned systems with new more detailed demands. The most important of these requirements is to increase flight efficiency. Whether for reducing environmental pollution, improving the economics of missions, or improving performance, increasing flight efficiency is desirable. [1]

There is a lack of good definitions for the flight efficiency of multi-rotor vehicles. Typically used to assess the qualities of an aircraft, the glide ratio apparently does not fit a vehicle that cannot glide. On the other hand, an all-electric multi-rotor vehicle is a very graceful flight test subject. It is possible to test a small object, which makes it possible to carry out this process with limited resources, while at the same time, the numerical control of the multicopter's components gives easy access to information about the energy consumption of individual components and the flight parameters.

In the presented paper, the author describes a novel, energy-based approach to assessing the flight efficiency of a multi-rotor aircraft and presents the results of flight tests of a typical quadcopter aimed at investigating the sensitivity of the flight efficiency function relating to changes in flight parameters, control parameters and basic vehicle components.

### **References**

[1] Johnson, Wayne. Rotorcraft Aeromechanics, Cambridge University Press, 2013. ProQuest Ebook Central, <https://ebookcentral-proquest-com-1000071ge8d65.eczyt.bg.pw.edu.pl/lib/wtu/detail.action?docID=1139714>.