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# THE COMPARISON OF SUSTAINABLE AVIATION FUELS THROUGH HYDROPROCESSED ESTERS AND FATTY ACIDS (HEFA) AND ALCOHOL-TO-JET (ATJ)

Wei-Cheng WANG<sup>1\*</sup>, Rusdan Aditya Aji NUGROHO<sup>2</sup>, Jhe-Kai LIN<sup>3</sup>

<sup>1-3</sup> Department of Aeronautics and Astronautics, National Cheng Kung University, Tainan, Taiwan

\* Corresponding author. Email address: wilsonwang@mail.ncku.edu.tw

**Abstract** – Approximately 21.2 billion of carbon has to be reduced for achieving Fly Net Zero. The International Air Transport Association has targeted the production of sustainable aviation fuel (SAF) to be 449 billion liters by the year of 2050. The feedstock supply by then is going to be problematic. This study compares the SAFs produced through two different route: Hydroprocessed Esters and Fatty Acids (HEFA), derived from triglyceride-based oil and Alcohol-to-Jet (ATJ) derived from alcohol. The HEFA SAF is produced from palm oil feedstock, and ATJ SAF is produced from ethanol and butanol (named ATJ-e and ATJ-b). Firstly, the properties of the two produced fuel products are measured and both compared with conventional jet fuel based on ASTM specifications, including density and viscosity with various temperatures, auto-ignition temperature, smoke point, flash point, cetane number, heating value, and distillation temperature. Secondly, the combustion behaviors of HEFA and ATJ SAFs, including the spray characteristics and ignition behaviors, are also examined and compared. In addition, the combustion behaviors of five different blendings (0 %, 25 %, 50 %, 75 %, 100 %) with HEFA and ATJ SAFs are tested.

**Keywords** – *Alcohol-to-Jet; butanol; combustion behavior; ethanol; Fly Net Zero; Hydroprocessed Esters and Fatty Acids; sustainable aviation fuel*

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