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航空宇宙工学専攻

Press Release



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NABLA Mobility Inc.
Department of Aerospace Engineering, Graduate School of Engineering, The University of Tokyo
Peach Aviation Limited

World's first: Fixed-flight Path Angle Descents were successfully conducted during a series of regularly scheduled commercial flights.

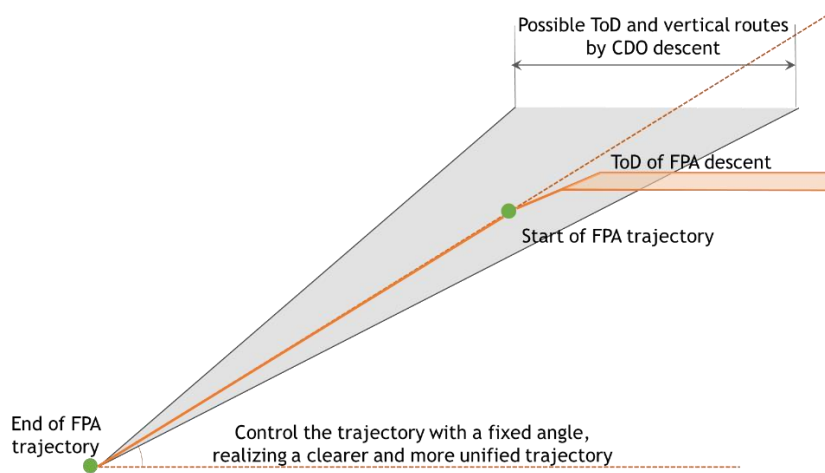
Tokyo, Japan. 30 January 2023, 11AM JST

[NABLA Mobility Inc.](#) (Shinjuku-ku Tokyo, CEO: Shinji Tanaka, NABLA Mobility), [Tsuchiya and Itoh Laboratory at Department of Aeronautics and Astronautics, Graduate School of Engineering, the University of Tokyo](#) (Bunkyo-ku Tokyo, Tsuchiya-Itoh Lab.), and [Peach Aviation Limited](#) (Sennan-gun Osaka, CEO: Takeaki Mori, Peach) announced today for collaborated on a world's first by conducting Fixed-flight Path Angle (FPA) Descents during a series of regularly scheduled commercial flights. These real world flights successfully proved that employing this descent technique results in meaningful operational benefits, and a significant reduction in environmental impact.

As carbon neutrality is promoted worldwide, CO2 reduction (*1) in the aviation sector is attracting attention in Japan as well. In this initiative, Tsuchiya & Itoh Lab and NABLA Mobility have conducted a demonstration study of FPA descent to reduce the environmental impact by leveraging their respective strengths based on Peach's operational data.

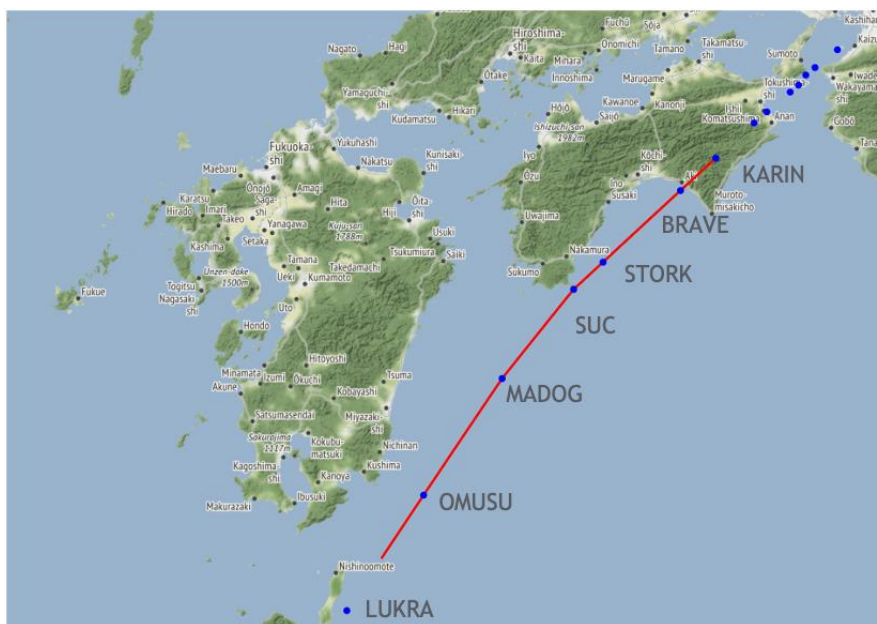
As a method to improve fuel efficiency during descent, the Continuous Descent Operation (CDO), in which an aircraft descends continuously from the starting point of descent on a cruise, is already in operation. However, CDO's trajectory differs from flight to flight because the most fuel-efficient vertical path is calculated based on the aircraft weight, wind, temperature, and aircraft type characteristics. Therefore, although CDO is more effective in reducing fuel consumption compared to the conventional stair-cased descent directed by air traffic controllers, CDO has been introduced only during the nighttime and early morning hours when there are few aircraft in the congestion zone at limited airports (e.g., Kansai International Airport) for safety reasons, and its implementation has been limited in number.

The FPA descent method demonstrated this time satisfies the altitude restrictions specified for air traffic control by using a certain descent angle, and also clarifies and unifies the vertical descent path. In a test using a flight simulator, the FPA descent in enroute airspace above a certain altitude demonstrated a high environmental load reduction effect of approximately 190 lb/flight compared to the conventional descent method and no problems with the pilot's operation and workload. The test results confirmed that FPA descent in en-route airspace above a certain altitude has no problem with pilot operability and workload.



Conceptual diagram of FPA descent (TOD: point of beginning descent from horizontal cruise flight)

In addition, FPA descent demonstration flights in en-route airspace were conducted on APJ220 (from Naha Airport to Kansai International Airport) for 17 days from December 7, 2022, as a continuous descent demonstration flight outside the current CDO implementation hours. 15 flights completed the FPA descent, and the expected environmental impact reduction effect was confirmed. The FPA descent was completed on 15 flights, and the expected reduction in environmental impact was confirmed. This is the world's first FPA descent demonstration on a scheduled flight.



Flight paths along which the demonstration flight performed the FPA descent

NABLA Mobility, Tsuchiya-Itoh Lab, and Peach will work together to accelerate the development of products and implementation of measures for the drastic decarbonization expected of the aviation industry through the launch of this collaborative effort. Also, we will accelerate the development of products and implementation of measures for the drastic decarbonization of the aviation industry through industry-academia collaboration.

【About NABLA Mobility Inc.】

NABLA Mobility is a startup company that designs, develops, and provides software to optimize airline flight operations. We improve operational resilience and decarbonization by introducing the latest technologies such as AI/ML to support better operational decision-making for aviation.

“Weave” is our software product that supports pilots to make optimal in-flight decision making, based on our own developed unique set of AI/ML technologies, “Untangle”

For the actual operation of FPA descent, we have planned and realized a joint project with Peach Aviation Limited and Tsuchiya-Itoh Laboratory of the University of Tokyo Aeronautics, leading industry-academia collaboration and the development of an operation support application.

For more information go to <https://www.nabla-mobility.com/>

【About Tsuchiya and Itoh Laboratory at Department of Aeronautics and Astronautics, Graduate School of Engineering, The University of Tokyo】

Tsuchiya-Itoh Laboratory, the University of Tokyo, conducts research to create an air traffic management system in which humans and aircraft cooperate to protect the environment, including flight dynamics control of aircraft and spacecraft. FPA descent was inspired by discussions Professor Eri Itoh of the University of Tokyo had with Dr. Steve Green at NASA Ames Research Center (*2). Prof. Itoh et.al. (*3, *4, *5) clarified operational feasibilities and energy-saving effects of the FPA descent, and proposed operations to reduce pilot and controller workload and fuel consumption for commercial airliners flying in congested airspace, in order to achieve FPA descent without equipment modifications.

【About Peach Aviation Limited】

Peach Aviation began operations from its base at Kansai International Airport in March 2012. Peach operates 31 domestic routes and 18 international routes from seven airports: Shin-Chitose, Sendai, Narita, Chubu, Kansai, Fukuoka, and Naha.

In this demonstration, we are providing our expertise and technology in aircraft operation to realize a demonstration test of FPA descent on a regularly scheduled route arriving at Kansai International Airport.

1 CO2 reduction efforts in the aviation sector in FY2021, Ministry of Land, Infrastructure, Transport and Tourism

<https://www.mlit.go.jp/common/001403136.pdf>

2 Eri Itoh, "Science behind the Air Travel," Kawade Shobo Shinsha, September 2016.

3 Eri Itoh et al, "Evaluation of Continuous Descent Operation with Fixed Angle of Descent by Full Flight Simulator," Transactions of the Japan Society for Aeronautical and Space Sciences 64(1), pp. 50-57, 2016.

4 Eri Itoh, et al, "Evaluating energy-saving arrivals of wide-body passenger aircraft via flight-simulator experiments." , Journal of Aircraft, 55(6), pp. 2427-2443, 2018

5 Eri Itoh, et al, "Feasibility study on fixed flight-path angle descent for wide-body passenger aircraft", CEAS Aeronautical Journal, 10, pp. 589-612, 2019.

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