# Ideal Aircraft-Structure Design with Carbon Fiber Reinforced Thermoplastics

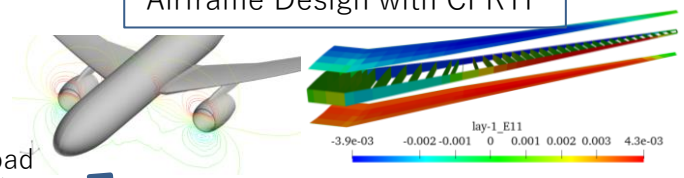
## WP1: Development of an Aircraft Design Simulator Using CFRTP

**Development of Aircraft Computational Science Center CFRTP Aircraft Integrated Design System**
( ①Obayashi/Yakeno Lab., Okabe/Abe Lab., Shimoyama Lab., ②, ③, ④, ⑤, ⑥, ⑦, ⑧, ⑨ )

The place of research
① Aircraft Computational Science Center
② School of Engineering, Tohoku University
③ Kawasaki Heavy Industries, Ltd.
④ SUBARU Corporation
⑤ Japan Aerospace Exploration Agency(JAXA)
⑥ Sophia University, Faculty of Science and Technology
⑦ Chiba laboratory at The University of Electro-Communications
⑧ Mitsubishi Heavy Industries, Ltd.
⑨ IHI Corporation

### Development and Evaluation of Simulation Method for Aerodynamic, Structural and Fracture Coupled Design of Airframe Using CFRTP

Airframe Design with CFRTP



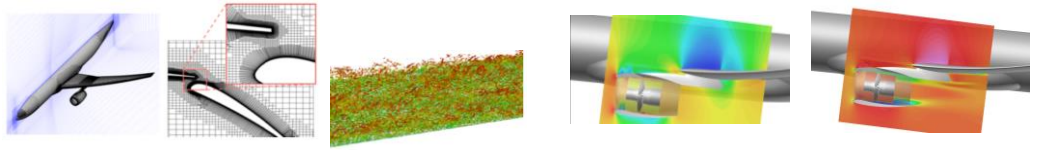

unsteady aero-load
(②Kai lab.、③)

Reduction of frictional resistance
( ①Obayashi,Yakeno Lab., Hattori and Hirota Lab. 、⑤、⑧)

Engine Aerodynamic Load (⑦、⑨)

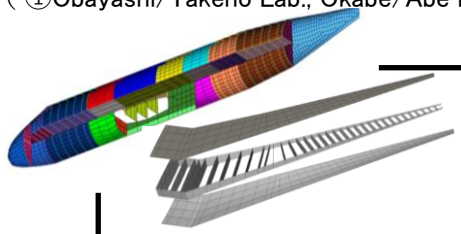
Aerodynamic load analysis by CFD for all aircraft

Analysis of engine fittings



### Development and construction of CFRTP Aircraft Design Simulator (CFRTP_AD)

( ①Obayashi/Yakeno Lab., Okabe/Abe Lab., Shimoyama Lab., ②Sawada Lab. 、③、④、⑤、⑥)



- Structural sizing of non-destructive aircraft
- Engine fitting
- Flutter conditions
- Aerodynamic load evaluation using CFD for all aircraft

Thermoplastic CFRP Virtual Testing System
(CFRTP_VT, developed in WP2)

・Input of Mechanical Properties and Strength of CFRTP
**.dat** file (generic text format)

Generic format output: **.vtk** file

- Safety factor and stress state of each member
- Thickness of the outer plate after sizing
- Destruction mode