



## Preliminary Design of Strut Braced Wing Aircraft and Aerodynamic Optimization on the Junction Geometry

LI Runze<sup>1</sup>, ZHANG Yufei<sup>1</sup>, CHEN Haixin<sup>1\*</sup>  
School of Aerospace Engineering, Beijing, 10084, China

### ABSTRACT

Strut Braced Wing (SBW) aircraft configuration promises to gain high lift-to-drag ratio by reducing structural weight and lift-induced drag. This paper conducts a configuration optimization using an in-house preliminary design software, ACADO. The results show that the SBW aircrafts can suppress wing deformation, and unload wing root bending moment or shear stress, which results to a smaller structural weight and enables a higher aspect ratio. The study shows that a SBW aircraft which shares the same payload of B777-200, can obtain a significant fuel consumption and maximum take-off weight reduction. Meanwhile, since the wing-strut junction region of the SBW aircrafts has the most significant influence on the interference drag, an aerodynamic optimization on the junction geometry of the PADRI platform (Platform for Aircraft Drag Reduction Innovation, 2017) is conducted to reduce shock wave strength and flow separation, a total 9.8 counts drag reduction is achieved.

**Keywords:** Strut Braced Wing, Junction, Preliminary Design, Aerodynamic Optimization

\*CHEN Haixin, PhD, Professor. Email: [chenhaixin@tsinghua.edu.cn](mailto:chenhaixin@tsinghua.edu.cn)