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Study of boundary layer transition on supercritical natural laminar flow wing at high Reynolds number through wind tunnel experiment[☆]

Jiakuan Xu^{a,1}, Ziyuan Fu^{b,2}, Junqiang Bai^{b,3,*}, Yang Zhang^{c,4}, Zhuoyi Duan^{d,5}, Yanjun Zhang^{d,6}

^aCenter for Applied Mathematics, Tianjin University, Tianjin, 300072, China

^bSchool of Aeronautics, Northwestern Polytechnical University, Xi'an, 710072, China

^cState Key Laboratory for Strength and Vibration of Mechanical Structures, Xi'an Jiaotong University, 701149, China

^dGeneral Design and Aerodynamic Department, Xi'an Aircraft Design Institute, Xi'an, 710089, China

Abstract

In order to achieve the goal of green aviation, energy conservation and emission reduction, laminar flow design technology has become a hot research topic. For transonic airliners, supercritical natural laminar flow wing design technology will significantly improve the aerodynamic performance (reduce flight drag, decrease fuel consumption and pollutant emissions). In this paper, airfoil optimization design system is applied to design the supercritical natural laminar flow airfoils based on high-precision boundary layer transition prediction technique. Then, three-dimensional layout of supercritical natural laminar flow wing is formed. Numerical simulations have been conducted to verify the laminar flow properties. In addition, the aerodynamic model with ratio of 1: 10.4 is processed to measure boundary layer transition phenomena in the high speed and low turbu-

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*Corresponding author

Email address: junqiang@nwpu.edu.cn (Junqiang Bai)

¹PostDoc

²Master student

³Professor

⁴Lecture

⁵Research Professor

⁶Senior engineer

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