

Abstract Submitted  
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**LES of turbulent separated flow over NACA0015 at Reynolds number 1,600,000—toward the separation control by a DBD plasma actuator** MAKOTO SATO, ISAS/JAXA, KENGO ASADA, University of Tokyo, TAKU NONOMURA, SOSHI KAWAI, HIKARU AONO, AIKO YAKENO, KOZO FUJII, ISAS/JAXA — Large eddy simulation of a separated flow over NACA0015 at Reynolds number 1,600,000 with angle of attack 20.1 deg. is conducted to clarify the feature of turbulent separation at high Reynolds number. The grid point is approximately 1 billion, and a high order scheme is used in this simulation. The LES result agrees with experiment data in terms of the laminar-separation bubble region, the locations of reattachment point and second separation point and  $C_p$  distribution. In the turbulent separated flow of this simulation, the laminar-separation bubble is formed near the leading edge with turbulent transition, then turbulent boundary layer develops over the airfoil surface and the flow is separated as turbulent separation. Here, streamwise velocities in the attached region correspond to the profile of turbulent boundary layer. In addition, flow structures at  $Re=1,600,000$  are compared to those at  $Re=63,000$  about the turbulent transition, separation behavior, the space scale, time scale and so on. The most unstable frequency of the laminar separation flow at  $Re=1,600,000$  is 10-20 times of that of  $Re=63,000$ . The flow scale at transition point of  $Re=1,600,000$  is about 1/15 times of that of  $Re=63,000$ .

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