## Abstract Submitted for the DFD12 Meeting of The American Physical Society

Parametric study on separation control by DBD plasma actuator over NACA0012 and NACA0015 airfoil at Reynolds number 63,000 MAKOTO SATO, TAKU NONOMURA, HIKARU AONO, Institute of Space and Astronautical Science, JAXA, KOICHI OKADA, Ryoyu Systems Co., Ltd, KOZO FUJII, Institute of Space and Astronautical Science, JAXA — Large-eddy simulations of the separated flow over NACA0012 and NACA0015 airfoil, which are controlled by a DBD plasma actuator, are conducted to clarify the relationship between turbulent transition around the airfoil and aerodynamic performance. In these simulations, position and operation conditions of DBD plasma actuator are varied as simulation parameters. The install position of actuator is 0%, 2.5%, 5%and 10 % chord length from the leading edge. The burst frequency is changed from 0.5 to 20. In addition, the degree of induced flow and burst ratio of actuation are changed. The promotion of turbulent transition around airfoil is closely related to the control of separation. From the parametric study of DBD position, it is clarified that the effective position of actuator to suppress the separation is near the separation point. In especial, the upstream of separation position is better for further suppression. From the simple analyses of turbulent kinetic energy distributions, it is clearly observed that the cases with earlier and smooth turbulent transition over airfoil have better aerodynamic performance in almost cases.

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