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Wall-modeled large-eddy simulation of transonic airfoil buffet at high Reynolds number¹ YUMA FUKUSHIMA, SOSHI KAWAI, Department of Aerospace Engineering, Tohoku University — In this study, we conduct the wall-modeled large-eddy simulation (LES) of transonic buffet phenomena over the OAT15A supercritical airfoil at high Reynolds number. The transonic airfoil buffet involves shock-turbulent boundary layer interactions and shock vibration associated with the flow separation downstream of the shock wave. The wall-modeled LES developed by Kawai and Larsson PoF (2012) is tuned on the K supercomputer for high-fidelity simulation. We first show the capability of the present wall-modeled LES on the transonic airfoil buffet phenomena and then investigate the detailed flow physics of unsteadiness of shock waves and separated boundary layer interaction phenomena. We also focus on the sustaining mechanism of the buffet phenomena, including the source of the pressure waves propagated from the trailing edge and the interactions between the shock wave and the generated sound waves.

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