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Application of mean wall shear stress boundary condition to complex turbulent flows using a wall-modeled large eddy simulation[1] MINJEONG CHO, JUNGIL LEE, HAECHEON CHOI, Seoul National University — The mean wall shear stress boundary condition was successfully applied to turbulent channel and boundary flows using large eddy simulation without resolving near-wall region (see Lee, Cho & Choi in this book of abstracts). In the present study, we apply this boundary condition to more complex flows where flow separation and redeveloping flow exist. As a test problem, we consider flow over a backward-facing step at $Re_h = 22860$ based on the step height. Turbulent boundary layer flow at the inlet ($Re_\theta = 1050$) is obtained using inflow generation technique by Lund et al. (1998) but with wall shear stress boundary condition. First, we prescribe the mean wall shear stress distribution obtained from DNS (Kim, 2011, Ph.D. Thesis, Stanford U.) as the boundary condition of present simulation. Here we give no-slip boundary condition at flow-reversal region. The present results are in good agreements with the flow statistics by DNS. Currently, a dynamic approach of obtaining mean wall shear stress based on the log-law is being applied to the flow having flow separation and its results will be shown in the presentation.

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