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Application of hybrid LES-RANS model to turbulent boundary layer flows over rough wall KOJIRO NOZAWA, Shimizu Corp., TETSURO TAMURA, Tokyo Institute of Technology — In this study, Large Eddy Simulation (LES) of turbulent boundary flows over homogenous roughness were performed using hybrid LES- RANS model which can represent appropriately and efficiently the roughness condition on ground surface[F. Hamba, Theoret. Comput. Fluid Dynamics 16, 387–403 (2003)]. In LES of boundary layer flows over vegetation fields, leaves and plants are too thin to resolve them by the sufficient number of grid points. So, the effect of those leaves and plants on the flow must be treated with an artificial model. The turbulence closure model for plant canopy flows in this study was proposed by Hiraoka and Ohashi[Proc. of The 4th Int. Symp. on Comp. Wind Eng., 693-696, (2006)], which is formulated based on RANS($k - \epsilon$) turbulence model. The upper limit of RANS region is set at $2h$, where h is the height of the canopy, and the higher region is simulated using one-equation SGS model of LES. To reduce the mismatch of mean velocity profile between RANS and LES regions due to a steep velocity gradient at the interface, the buffer region is introduced, where LES works well by the smooth changes of the filter width according to the distance from the LES-RANS interface. The boundary layer thickness is approximately $200h$ and the Reynolds number ($= U\delta/\nu$) is 2.0×10^7 . The mean velocity profiles and turbulence characteristics are compared to the results obtained by full scale measurements of the past studies.

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