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RANS Wall Modelling for Variable Viscosity Turbulence<sup>1</sup> KAZUHIKO SUGA, HAJIME KATASHIBA, YUSUKE KUWATA, Osaka Prefecture Univ — With a large temperature difference, modification of turbulence characteristics by temperature-dependent fluid properties becomes nonignorable. It is thus clear that the standard logarithmic law of mean velocities cannot be valid in such a case. To provide an alternative wall model, this study modifies the analytical-wall function by introducing a temperature-dependent near-wall layer for the viscosity. The Favre averaged thin boundary-layer equations (TBLEs) for the momentum and the temperature are considered to construct the wall-function. To take account of the effects of the steep temperature-dependent near-wall viscosity, this study models the viscosity profile as a simple function of the normalized distance from the wall. The TBLEs are, then, integrated inside wall-adjacent cells to obtain the wall shear stress and the wall heat flux for the wall boundary conditions. The simulated results show that the proposed model successfully contributes to reproducing the skewed mean velocity and temperature profiles by the RANS  $k - \varepsilon$  model.

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