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Effect of surface heating on the drag crisis of sphere MASAYA MUTO, HIROAKI WATANABE, Central Research Institute of Electric Power Industry, MAKOTO TSUBOKURA, Hokkaido University — The characteristics of flow past a heated sphere are investigated at around critical Reynolds number in conditions using three-dimensional numerical simulation in which temperature dependence of fluid properties such as density and viscosity is exactly considered. Boussinesq approximation is no longer applicable due to large temperature difference adopted in this study. And the order of the buoyancy effect becomes relatively small compared to inertia effect in present Reynolds number region. The result shows that drag coefficient of the heated sphere in drag crisis region becomes larger than that of the unheated case and it increases up to the coefficient found in subcritical region. This is because the temperature difference between the sphere and ambient fluid strongly affects the flow separation points, resulting in small recovery of the pressure in the wake and reduction of the temporal fluctuation of the lift force acting on the sphere. These effects are considered to attribute to the temperature dependence of fluid properties in the vicinity of the sphere and effect on the transient of the boundary surface.

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