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Solution of Reynolds-averaged Navier-Stokes equations by discontinuous Galerkin method SUNGWOO KANG, JUNG YUL YOO, Seoul National University — Discontinuous Galerkin method is a finite element method that allows discontinuities at inter-element boundaries. The discontinuities in the method are treated by approximate Riemann solvers. One important feature of the method is that it obtains high-order accuracy for unstructured mesh with no difficulty. Due to this feature, it can be useful for various practical applications to turbulence and aeroacoustics, but there are few problems to be solved before the method is applicable to practical flow problems. Due to discontinuous approximations in discontinuous Galerkin method, the treatments of viscous terms are complicated and expensive. Moreover, careful treatments of source terms in turbulence model equations are necessary for Reynolds-averaged Navier-Stokes equations to prevent blow-up of high-order-accurate simulations. In this study, we compare high-order accurate discontinuous Galerkin method with different viscous treatments and stabilization of source terms for compressible Reynold-averaged Navier-Stokes equations. Spalart-Allmaras or k-ω model is used for turbulence model. To compare the implemented formulations, steady turbulent flow over a flat plate and unsteady turbulent flow over cavity are solved.

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