A new explicit projection method for incompressible flows SAN-GRO PARK, CHANGHOON LEE, Yonsei University — When solving unsteady incompressible flows, the divergence-free condition should be satisfied. For this, the non-linear terms in the Navier-Stokes equation should be projected onto divergence-free space by an operator which arises from taking divergence of the Navier-Stokes equation. The calculation of projecting non-linear fields requires a lot of computational cost because the projection typically relies on an iterative solution of pressure. In this study, we propose an explicit projection method based on the spectral solution of the Poisson equation in the infinite domain and local truncation in the physical space, which does not require iterations. For validations of our methods, we applied the proposed method to the 2-dimensional Taylor-Green vortex simulation and forced isotropic turbulence simulation. The test results show that our method saved computational cost enormously while maintaining reasonable accuracy of flow field. More details about the suggested method and the performance of the method will be discussed in the meeting.

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