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A new fully explicit algorithm for incompressible flows SANGRO PARK, CHANGHOON LEE, Yonsei University — The Poisson equation for pressure arising from nonzero divergence of the nonlinear term in the integration of the Navier-Stokes equations requires a lot of computational cost except for cases with periodic domain. In order to mitigate this cost, we propose a new project algorithm which is fully explicit, thus not requiring iterations. The projection operator, $1 - \kappa_i \kappa_j / \kappa^2$, which projects any vector field with divergence into the divergence-free subspace in the Fourier space, when transformed into the physical space, shows decaying distribution with the distance from the point in question. This allows truncation so that the resulting local distribution of the projection operator, through convolution, can be used to obtain projected nonlinear terms which has relatively small divergence. This "approximate" projection scheme was then applied to direct numerical simulation of isotropic turbulence to investigate effectiveness and efficiency of the scheme in reducing divergence and correct projection of the nonlinear terms through the statistical properties of the turbulent flow. Performance of the scheme in a variety of aspects is investigated and details will be presented in the meeting.

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