

High Order Framework

Extrem CFD workshop # 3

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Analytical test-cases

- Pure Diffusion

$$0 = \nu \frac{\partial^2 u_i}{\partial x_j \partial x_j} + F_i^A$$

- Advection-Diffusion

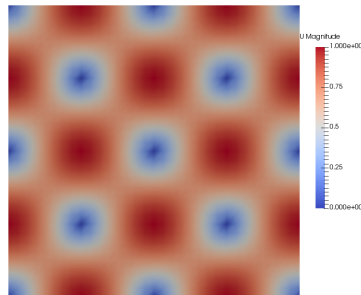
$$u_i \frac{\partial u_i}{\partial x_j} = \nu \frac{\partial^2 u_i}{\partial x_j \partial x_j} + F_i^B$$

- Navier-Stokes

$$u_i \frac{\partial u_i}{\partial x_j} = \nu \frac{\partial^2 u_i}{\partial x_j \partial x_j} + F_i^C$$

F_i : Forcing term

Time: 0.000000



Velocity field

High Order Framework : Taylor-Green vortices 2/2

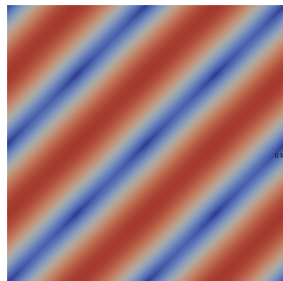
Navier-Stokes (Advection-Diffusion-Pressure)

- Regular QUAD2TRI mesh + space_int_4TH + CFL=0.5 + Fo=0.1
- **Non-stable** case on long-time
- Stability depends on regime (Inertial or Viscous)
⇒ The higher the Reynolds the higher the faster the instability arises
- Still, **should** be relevant to look at improvements

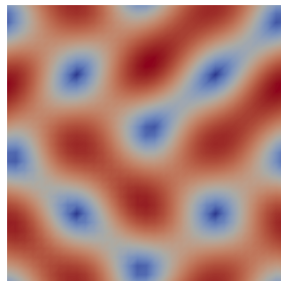
Time: 5.005668

Time: 90.009766

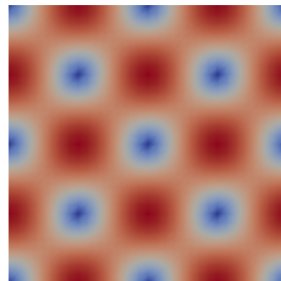
Time: 99.000977



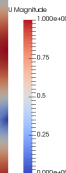
$\nu = 10^{-3}$



$\nu = 10^{-2}$



$\nu = 10^{-1}$



High Order Framework : Merging into master

already merged

- SUBPAIR data
- grid metrics computation
 - node moments
 - deconvolution matrix
 - pair / subpair moments

(large) merge-request sent

- High Order Solver (hos)
- HOF Gradient and Hessian computation
- Point-wise data reconstruction

comming merge-request (soon)

- application to multiphase flow
 - curvature computation
 - mass transfer rate at interface