Annulus Benchmark: Thieulot&Puckett 2018

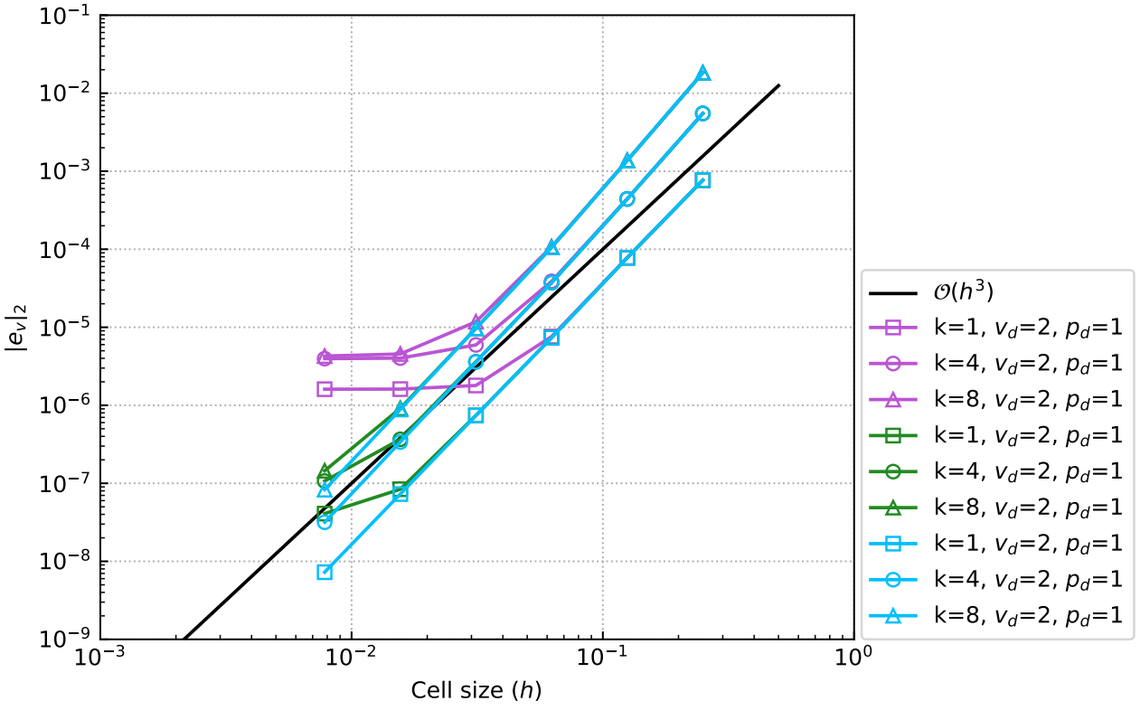
Benchmark Case

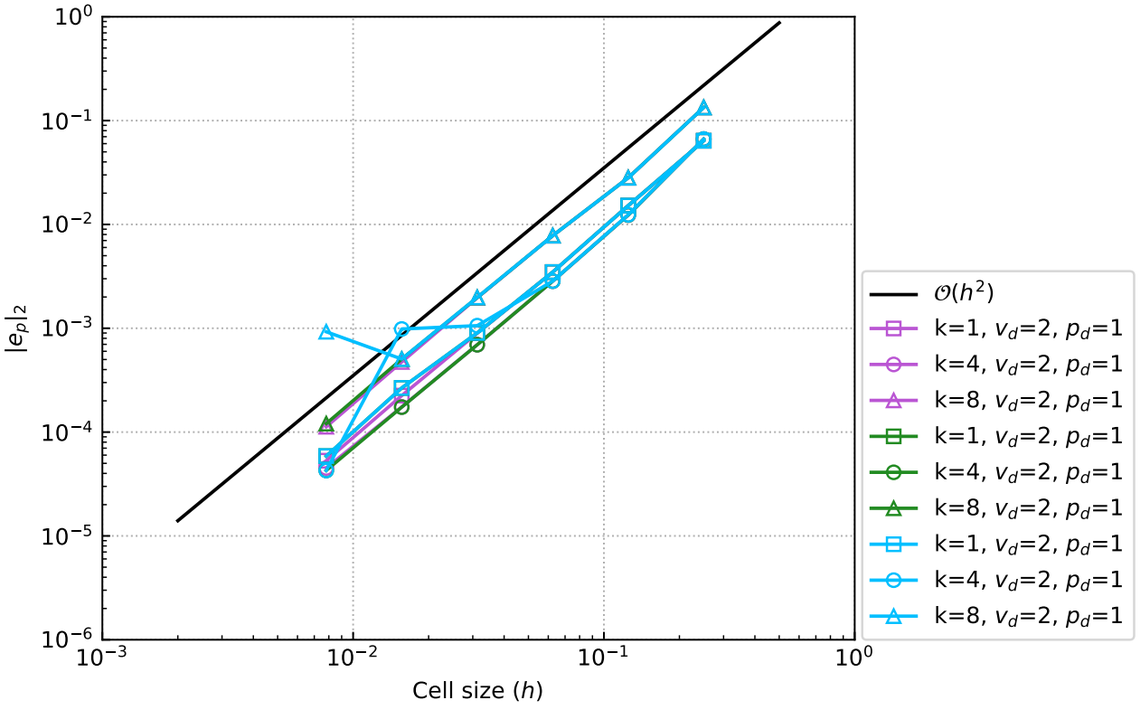
This benchmark creates an isoviscous, isothermal solution of the incompressible Stokes equations for which simple kinematic boundary conditions lead to structures that are serve as a model of "convection cells", where the number of these cells is determined by a single parameter k. In this case, the velocity is only prescribed on the inner and outer boundaries $r = R_1, R_2$ and in what follows we have set $\rho_0 = 0$.

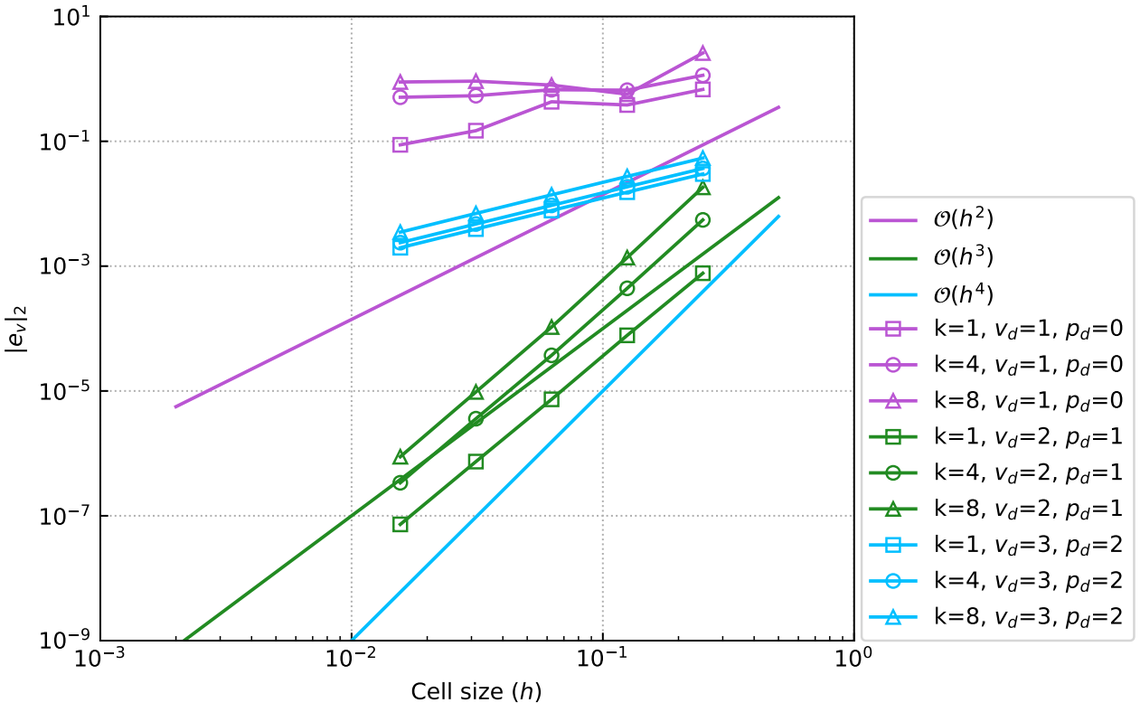
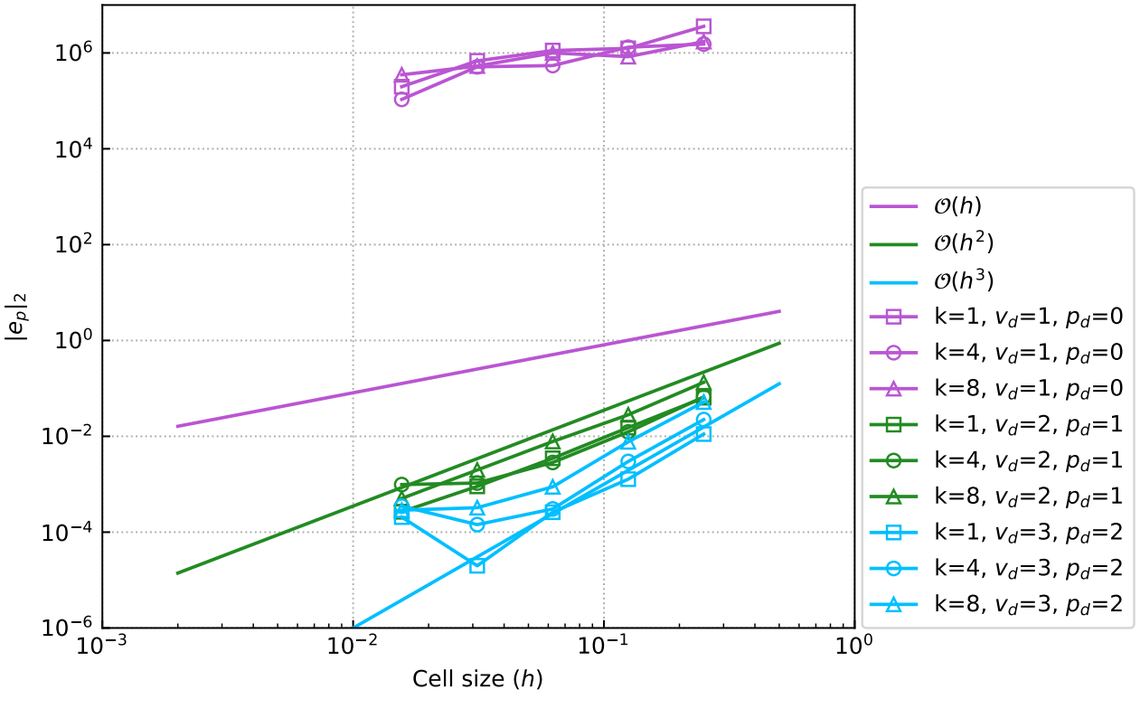
```
    # boundary conditions
    v_diff =  v_uw.sym - v_ana.sym
    stokes.add_natural_bc(2.5e6*v_diff, "Upper")
    stokes.add_natural_bc(2.5e6*v_diff, "Lower")
```

L_2 norm of the error

Velocity penalty: 2.5e6 (magenta), 1e8 (green), 1e10 (skyblue)
Stokes tolerance: 1e-10
Stokes element: P_2P_1





L_2 norm of the error

Stokes elements: $P_1P_0(disc.pressure), P_2P_1, P_3P_2$
Velocity penalty: 2.5e6, 1e10, 1e10
Stokes tolerance: 1e-7, 1e-10, 1e-10