Successive finite element methods for Stokes equations

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ABSTRACT

We will suggest a new economic finite element method for Stokes equations. Its main character is the local successive steps for the pressure. For an example, in $P^4 - P^3$ case, a $P^3$-pressure $p_h$ is calculated in 5 steps consisting of 4 local and 1 global systems as in figure 1. The chief time cost of the new method is on solving two separated linear systems. One is for the velocity and the other is for the $P^0$-pressure.

Figure 1. successive pressures calculated in $8 \times 8 \times 4$ mesh