

Stokes flow computational modeling and comparative study between approximation spaces

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ABSTRACT

The present work proposes a numerical analysis adapted to different approximation spaces for Stokes flow problem. A computational method based on a mathematical formulation will be constructed for continuous Finite Element Method (FEM) and compared to H(Div) and Discontinuous Galerkin Method (DGM) [1]. In order to obtain a numerical simulation compatible with imposed conditions, a computational code will be implemented in PZ [2], an object oriented environment for scientific programming. This approach will make possible a comparative study between approximation spaces, verifying orders, errors and rates of convergence; identifying best performance. This work will also be motivated to describe the motion of a viscous fluid relevant to civil construction applications. In this direction, a computational modelling of Stokes flow through a porous domain will be simulated to enable further analysis of self-compacting concrete (SCC) flow around reinforcing bars. Results can be compared to a homogenization technique representing reinforcing bars domain by the Darcy law and interface coupled with Stokes flow theory. The aim of this work is to understand a relevant and applicable Stokes flow problem, verifying performance of approximation spaces and mathematical optimization.

REFERENCES

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