14th World Congress on Computational Mechanics (WCCM XIV)
8th European Congress on Computational Methods in Applied Science and Engineering (ECCOMAS 2020)
July 19–24, 2019, Paris, France

NOVEL MODELLING AND NUMERICAL APPROACHES FOR FLOW AND TRANSPORT PROCESSES IN POROUS MEDIA TRACK NUMBER 600

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Key words: Fluid Dynamics, Porous Media, Numerical Methods, Multiscale

ABSTRACT

Porous media are ubiquitous in many industrial and natural processes, and there is a growing need of understanding and predicting the multiscale flow and transport phenomena in key energy and manufacturing sectors such as subsurface reservoirs, vadose and root zones, composite materials, filtration, and catalytic reactors, just to name a few.

Specific challenges in geological media, include heterogeneities at all scales, discontinuities, while they share other modelling difficulties with engineered porous media, such as complex evolving structures, non-stationary and non-equilibrium dynamics, ill-posed calibration and validation, coupling with multiphase, thermal and mechanical processes.

To tackle these challenges, we advocate a renewed effort in developing flexible modelling and numerical approaches, capable of describing effectively and solving coupled systems of Partial Differential Equations in complex and heterogeneous domains. These include extensions of the classical analytical techniques, such as *Volume Averaging* and *Homogenisation*; specific methods to tackle discontinuities, non-linearities, high-frequency applications; as well as numerical methods such as *Virtual Elements*, *Multiscale Finite Elements and Volumes*, naturally well-suited for some these challenges.

In this minisymposium, we bring together Applied and Numerical Mathematicians, Physicists, Chemical, Petroleum, and Environmental Engineers, Hydrogelogists, to discuss the wider applicability and relevance of mathematical and modelling techniques, and to transfer and bring new ideas into the traditional porous media community.

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