



SEMINARIO DE ANÁLISIS NUMÉRICO Y MODELACIÓN MATEMÁTICA

GIMNAP-Departamento de Matemática, UBB
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Expositor:

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Título de la Charla:

*A mixed-primal finite element method for the coupling
of Brinkman-Darcy flow and nonlinear transport*

Fecha y Hora:

Martes 28 de Enero de 2020, 15:30 Horas.

Lugar:

Auditorio Alamiro Robledo, FCFM

Universidad de Concepción.

Resumen

In this talk we present the mathematical and numerical analysis of a model describing the interfacial flow-transport interaction in a porous-fluidic domain. The medium consists of a highly permeable material, where the flow of an incompressible viscous fluid is governed by Brinkman equations (written in terms of vorticity, velocity and pressure), and a porous medium where Darcy's law describes fluid motion. The Brinkman-Darcy equations are coupled to a nonlinear transport equation accounting for mass balance of a scalar concentration. We introduce a mixed-primal variational formulation of the problem and establish existence and uniqueness of solution using fixed-point arguments. A family of Galerkin discretisations that produce divergence-free discrete velocities is also presented and analysed using similar tools to those employed in the continuous problem. Convergence of the resulting mixed-primal finite element method is proven, and some numerical examples confirming the theoretical error bounds and illustrating the performance of the proposed discrete scheme are reported.