
SEMINARIO DE ANÁLISIS NUMÉRICO Y MODELACIÓN MATEMÁTICA

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Título de la Charla:

*A Banach space mixed formulation for the unsteady
Brinkman–Forchheimer equations*

Fecha y Hora:

Martes 13 de Octubre de 2020, 15:30 Horas.

Lugar:

Seminario online
Plataforma Zoom

Resumen

We propose and analyze a mixed formulation for the Brinkman–Forchheimer equations for unsteady flows. Our approach is based on the introduction of a pseudostress tensor related to the velocity gradient and pressure, leading to a mixed formulation where the pseudostress tensor and the velocity are the main unknowns of the system. We establish existence and uniqueness of a solution to the weak formulation in a Banach space setting, employing classical results on nonlinear monotone operators and a regularization technique. We then present well-posedness and error analysis for semidiscrete continuous-in-time and fully discrete finite element approximations on simplicial grids with spatial discretization based on the Raviart–Thomas spaces of degree k for the pseudostress tensor and discontinuous piecewise polynomial elements of degree k for the velocity and backward Euler time discretization. We provide several numerical results to confirm the theoretical rates of convergence and illustrate the performance and flexibility of the method for a range of model parameters.