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Experimental Analysis of Flow-Induced Matrix Deformation on Deviation from Darcy's Law in Deformable Porous Media BENJAMIN MUNRO, SID BECKER, University of Canterbury — When a viscous fluid flows through a deformable porous medium, the response of the matrix and the flow field is coupled. The flow of the fluid through the elastic media causes matrix deformation and conversely, deformation of the matrix affects the fluid field by altering pressure within the pores. This study concerns the effect of flow-induced matrix deformation on deviation from Darcy's law at low Reynolds numbers in a deformable porous medium. The experiments consist of a glycerol and water mixture driven through an isotropic elastic porous matrix by an externally applied pressure gradient. The method of elastic matrix manufacture allows for a particular control of the matrix parameters: elasticity and pore geometry. The coupled solid-fluid interaction is then observed in an experimental test rig which captures the global flow behaviour, matrix deformation, and the onset of deviation from Darcy's law at low Re. The experimental data is then compared against theoretical and computational models, and presented so that the results can be used for numerical validation.

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