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NUMERICAL METHODS FOR MULTIPHASE-FLOW IN PERVIOUS CONCRETES COMPONENTS

Rodrigo N. Arriondo, Laura Battaglia and Pablo A. Kler

Centro de Investigación en Métodos Computacionales (CIMEC) - UNL/CONICET, Colectora RN 168 Km 472, S3000GLN Santa Fe, Argentina, (rarriondo,lbattaglia,kler)@cimec.unl.edu.ar, https://cimec.conicet.gov.ar

Grupo de Investigación en Métodos Numéricos en Ingeniería (GIMNI), UTN Facultad Regional Santa Fe - Lavaise 610, Santa Fe, Argentina

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Abstract. Modular concrete drainage structures have been used for several decades in urban drainage systems due to their high durability and low cost. As a result of the consistent growth of this technology and its importance in the management of urban rainwater surpluses, the need for characterizing the hydraulic behavior of these materials becomes evident. The study of flow in porous media has numerous antecedents, mainly in Geology. For this purpose, there are different approaches ranging from Darcy's equation to more complex formulations involving the micro-scale of materials, where, in addition to the complexity, the computational cost of its numerical resolution increases. In the case of draining concretes, the relevance of the different models and numerical methods is nowadays under study. This work presents a numerical study of the performance (representation capabilities) of available differential formulations implemented on finite volume methods. The physical parameters that characterize draining concretes (and porous materials in general) in these formulations will also be evaluated. Both the formulations and their numerical implementation, as well as the proposed parameters, will be contrasted with experimental results shown in the literature. The porousmultiphaseFOAM solver included in the OpenFOAM platform will be used as a numerical tool. The results obtained will contribute to a better understanding of the hydraulic capacities of this material and to the future development of specific numerical tools for the design and implementation of construction strategies based on draining concretes for several uses.