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Supplementary material

Table S1 Nomenclature

Symbol	Units	Definition	Symbol	Units	Definition
Φ	-	Total hydraulic head	K_{ij}	m s^{-1}	Hydraulic conductivity tensor
v	m s^{-1}	Apparent seepage velocity	g	m s^{-2}	Gravitational acceleration
k_{ij}	m^2	Permeability tensor	ν	$\text{m}^2 \text{s}^{-1}$	Kinematic viscosity of fluid
δ_{ij}	-	Kronecker's delta	c_1	-	Crack density at the percolation threshold
λ	-	Connectivity	F_0	-	Dimensionless crack density (=tr F_{ij})
P_{ij}	m^2	Tensor related to crack geometry with aperture	τ	-	Tortuosity
ρ	m^{-3}	Number of Cracks per unit volume	L	m	Flow path length
r	m	Crack radius	a	m	Straight-line distance
t	m	Crack aperture	β	-	Constrictivity
n_i, n_j	-	Direction cosines of $\mathbf{n}$	A	-	Cross-sectional area
$E(\mathbf{n}, r, t)$	-	Density function of n, r, t	T_{ij}	-	Crack network parameter
N_{ij}	-	Fabric tensor	Λ_{ij}	-	Modified correction factor
$m(\mathbf{q})$	m^{-1}	Crack number per unit length of intersected scan line	V	m^3	Volume
t_0	m^{-1}	Initial aperture of crack	$m^{(V)}$	-	Total number of cracks in volume
σ'_n	Pa	Effective normal stress	s	m^2	Crack surface area
γ'	Nm^{-3}	Submerged unit weight	AI	-	Anisotropy index of crack orientation ($0 < AI < 1.41$)
H	m	Mechanical parameter of crack	$J_2^{(\hat{F})}$	-	Second invariant of the deviatoric tensor of F_{ij}
S_0	m^{-1}	Crack surface area of all cracks per unit volume	$\rho_{3-D,c}$	-	Dimensionless crack density based on excluded volume