

# EXPLORING THE INTER-RELATIONSHIP BETWEEN CLIMATIC CONDITIONS AND HEAT-WATER TRANSFER IN DEFORMABLE CRACKED SURFACE STRATA

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## 1. APPENDIX

The set of thermo-hydro-mechanical material parameters which were used in the numerical model are summarized below in [Tables A1](#) and [A2](#).

<b>Table A1:</b> The thermos-hydraulic parameters of the numerical model.		
<b>Parameter</b>	<b>Description</b>	<b>Value</b>
$\kappa^{Macro}$	Matrix elastic stiffness parameter at macro level for changes in mean stress ( $p$ )	0.02
$\kappa^{micro}$	Matrix elastic stiffness parameter at micro level for changes in mean effective stress, ( $p + s^{micro}$ )	0.1
$\kappa_s$	Elastic macro stiffness parameter for changes in macro suction ( $s^{macro}$ )	0.01
$\nu^M$	Poisson's ratio	0.3
$K_{min}^{Macro}$	Minimum bulk modulus at macro level (MPa)	0.001
$K_{min}^{micro}$	Minimum bulk modulus at micro level (MPa)	0.001
$f_{sd0}$	Micro and macrostructure coupling functions when SD is activated	-0.1
$f_{sd1}$	Micro and macrostructure coupling functions when SD is activated	1.1
$n_{sd}$	Micro and macrostructure coupling functions when SD is activated	2
$f_{si0}$	Micro and macrostructure coupling functions when SI is activated	-0.1
$f_{si1}$	Micro and macrostructure coupling functions when SI is activated	1.1
$n_{si}$	Micro and macrostructure coupling functions when SI is activated	0.5
$M$	Slope of the critical state line	1
$r$	Coefficient describing the change in cohesion with suction	0.78
$\beta$	Coefficient describing the change in cohesion with suction ( $\text{MPa}^{-1}$ )	5
$p_c$	Reference pressure (MPa)	0.01
$k_s$	Coefficient describing the increase of tensile strength with suction	0
$p_{t0}$	Cohesion corresponding to suction equal to zero (MPa)	0.01
$p_0^*$	Pre-consolidation mean stress for saturated soil (MPa)	0.11
$\omega$	Coefficient of non-associativity	1
$\lambda(0)$	Slope of the virgin loading line in the $e-\ln(p)$ diagram	0.65

*SD = Suction decrease, SI = Suction increase*

<b>Table A2:</b> Input parameters of the mechanical constitutive model.		
<b>Parameter</b>	<b>Description</b>	<b>Value</b>
$P_0$	Measured P at certain temperature (MPa)	3.44
$\sigma_0$	Surface tension (N/m)	0.072
$\lambda$	Shape function for retention curve	0.3
$S_{rl}$	Residual saturation	0
$S_{ls}$	Maximum saturation	1
$k_0$	Intrinsic permeability (m <sup>2</sup> )	$2.5 \times 10^{-19}$
$\lambda$	Model parameter	0.3
$A$	Constant parameter	1
$\lambda$	Model parameter	3
$D$	Model parameter (m <sup>2</sup> . Pa. s <sup>-1</sup> . K <sup>-n</sup> )	$5.9 \times 10^{-6}$
$n$	Model parameter	2.3
$\tau_{au}$	Coefficient of tortuosity	1
$\kappa_{dry}$	Thermal conductivity of the dry porous medium (W/m <sup>°K</sup> )	0.646
$\kappa_{sat}$	Thermal conductivity of the water saturated porous medium (W/m <sup>°K</sup> )	1.4396