

# Nomenclature

Table of variables in Section 3

$\alpha$	Biot constant
$\epsilon$	total strain
$\epsilon^c$	creep strain
$\epsilon^p$	plastic strain
$\epsilon^T$	thermal strain
$\rho$	fluid density
$\sigma$	Cauchy (total) stress
$\tilde{\sigma}$	effective stress
$c_0$	specific storage coefficient
$\mathbf{D}$	fourth-order elasticity tensor
$\mathbf{f}$	body force
$\mathbf{g}$	gravity vector
$\mathbf{I}$	second-order unity tensor
$\mathbf{K}$	rock permeability tensor divided by fluid viscosity
$\mathbf{n}$	outward unit normal vector
$p$	fluid pressure
$q$	source or sink term
$\mathbf{u}$	displacement vector
$\mathbf{z}$	Darcy velocity

Table of variables in Section 7.1

$\mu_\alpha$	viscosity of phase $\alpha$
$\xi_i^\alpha$	molar fraction of component $i$ in phase $\alpha$
$\rho_\alpha$	density of phase $\alpha$
$\phi$	porosity at current configuration
$\phi_0$	reference porosity
$\Phi_i^\alpha$	fugacity coefficient of component $i$ in phase $\alpha$
$c_r$	rock compressibility constant
$f_i^\alpha$	fugacity of component $i$ in phase $\alpha$
$\mathbf{g}$	gravity vector
$k_{r\alpha}$	relative permeability of phase $\alpha$
$\mathbf{K}$	absolute permeability tensor
$n_c$	number of hydrocarbon components
$N_i$	molar concentration of component $i$
$p$	reference phase pressure
$p_0$	reference pressure
$p_\alpha$	pressure of phase $\alpha$
$p_{c\alpha}$	capillary pressure of phase $\alpha$
$q_i$	source or sink term for component $i$
$S_\alpha$	saturation of phase $\alpha$
$T$	reservoir temperature
$\mathbf{u}_\alpha$	Darcy velocity of phase $\alpha$

Table of variables in Section 7.2

$\phi^*$	effective porosity at current configuration
$M$	Biot's modulus
$\mathbf{u}_0$	initial displacement at reference pressure $p_0$

Table of variables in Section 7.3

$\alpha, \gamma, A, e, R$	constants related to the shapes of the shear envelope and cap portion
$\tilde{\alpha}$	$[\Delta^*]_n / [\Delta]_n$
$\beta$	friction angle
$\Gamma$	cohesion
$[\Delta]_n$	normal displacement jump at which normal traction reaches maximum
$[\Delta]_t$	tangential displacement jump at which tangential traction reaches maximum
$[\Delta]^*$	$[\Delta^*]_n = [\mathbf{u}]_n _{t_n=0}$
$\epsilon^p$	plastic strain
$\lambda$	nonnegative consistency parameter
$\boldsymbol{\sigma}$	Cauchy (total) stress
$\sigma_0$	material shear-related strength
$\tilde{\boldsymbol{\sigma}}$	effective stress
$\boldsymbol{\tau}$	shear stress
$\Phi$	interfacial potential
$\Psi$	ratio of tri-axial extension strength to compression strength
$\Psi_n$	$\Psi_n = e\sigma_{\max}[\Delta]_n$
$\Psi_t$	$\Psi_t = \sqrt{e/2}\tau_{\max}[\Delta]_t$
$F$	flow potential
$H$	Heaviside function
$I_1$	first invariant of effective stress tensor
$II$	fourth-order identity tensor
$J_2$	second invariant of effective stress tensor
$J_3$	third invariant of effective stress tensor
$K_0$	intersection coordinate of the shear and cap portions
$\mathbf{n}$	outward unit norm vector
$q$	$\Psi_n / \Psi_t$
$\mathbf{t}$	traction at prescribed boundary
$t_n$	normal traction
$t_t$	tangential traction
$[\mathbf{u}]$	displacement jump across interface
$[\mathbf{u}]_n$	$[\mathbf{u}]_n = [\mathbf{u}] \cdot \mathbf{n}$
$[\mathbf{u}]_t$	$[\mathbf{u}]_t = \ (II - \mathbf{n} \otimes \mathbf{n})[\mathbf{u}]\ _2$
$x$	$x = [\mathbf{u}]_n / [\Delta]_n$
$X_0$	material compaction strength
$\gamma$	$\gamma = [\mathbf{u}]_t / [\Delta]_t$
$Y$	material yielding function
$Y_s$	shear envelop yielding function