Superfast non-linear diffusion model of capillary transport in particulate porous media

by

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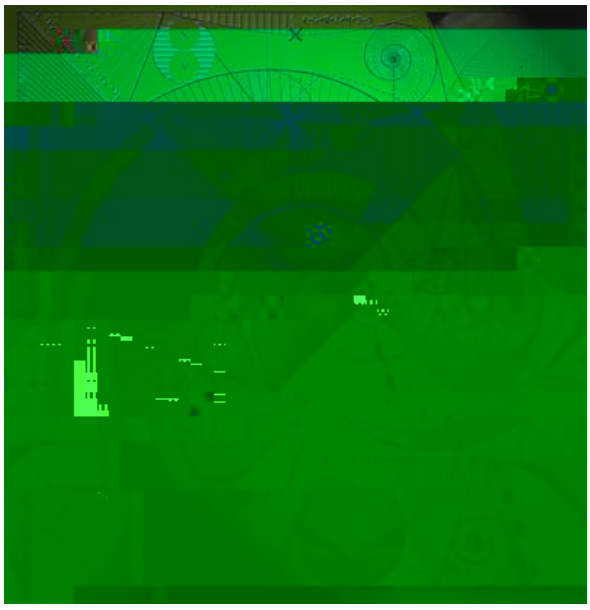

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A L y no [1] M M shch h[2] M B nes[1] G heof no s[2]

Dep r en of M he cs nd s cs n ers y of Re d ng Re d ng RG AX [1]

Cen er for R s d es nd fe y n ers y of C forn n B r r n B r r CA A [2]

Abstract

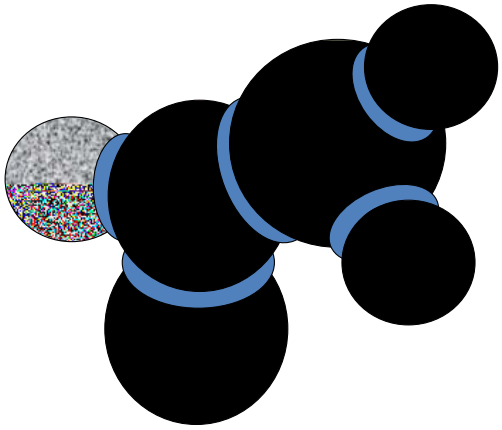
The migration of liquids driven by the capillary fdn

s r on e e he q d do ns y e her e he for of so ed pend r r ngs or
s p y q d r dges for ed e een he spher c p r c es he po n s of con c s_{min}
s $_{\ell}$ − or hey y co escence n o ore co p e s r c res e r ers pen ers

s r on reg e on y occ rs o er he s rf ce e e en s of he gr ns h e gener heore
c n ys s of e ng o s o er ro gh s rf ces s essen y nco p e e one c n o n n
es e of he per e y coe c en on he s s of res s f

fron n he c se of PME he s es of $s \approx$ he fron e d o he so c ed s gn on
for h ch $\mathbf{v} \approx$ nd ng es occ r efore he fron e ec e y s r s o ng h s

$\tau \approx$ n he yp c r e e ponen of he second reg e q_p efore he fron re ches s gn on po n s fo nd o e $V \tau \propto \tau^{q_p}$ $q_p^{TEHP} -$. $\pm$. F g A s r e of $q_p^{TCP} -$ $\pm$. h s een fo nd n he c se of spre d ng of no her pers s en q d CP h so e h d eren phys c proper es no ce y he coe c en of s rf ce ens on nd he con c ng es $p_{vs} \simeq \times$ $^{-5}$P $-$. $\pm$ N $\simeq$ P $\cdot$ s $\frac{s}{1} \approx$ $^\circ$ $\frac{r}{1} \approx$ $^\circ$ As e see f r her n he co p r son hese es of q_p gree ery e h he ones fo nd n o r n er c s ons of n hree d ens on c se h p r e ers s_r^0, s_F re e n o o r e per en cond ons p r e er D_0 does no ec he r e e ponen nd c n on y resc e e τ One needs o e ph s se h n gener he r e e ponen s f nc on of s_r^0, s_F n he ode h s f ne on os f



F g re s r on of he pend r r ng reg e o e e s of s r on