

List of symbols

Latin

A	m^2	Area
a	m	Base radius of the grease patch
b	m	Thickness of the paper
C, C^*	m^{-1}	Specific wetting area, wetting area per unit oil volume
c	–	power law constant, related to β
c_*	kg/m^2	Reference mass concentration of oil
H	m	Height of oil front in the grease matrix
h	m	Height of oil front during capillary rise
I	–	Intensity
i, j	–	Indexes of an image pixel
k	m^2	Permeability
m_s	kg	Mass of oil when all pores are saturated
m_{tot}	kg	Total mass of oil available in drop or patch
m_0	kg	$\rho\phi_p b\pi a^2$
$n(s)ds$	m^{-3}	Number density of pores with a radius between s and $s + ds$;
n_t	m^{-3}	Total number density of pores
p	Pa	Pressure
q, q_0	m^{-1}	Attenuation coefficients
R	m	Effective stain radius
R_{fr}	m	Radius of the edge of the stain
r, z	m	Radial, axial coordinates
S	–	Integrated intensity contrast
S_∞	–	Integrated intensity contrast after full absorption
s	m	Pore radius
t	s	Time
t_s, t_r	s	Characteristic spreading, capillary rising time
v	m/s	Velocity
w	$m/s^{1/2}$	Constant

Greek

$\alpha(s)$	-	Fraction of filled pores with a radius between s and $s + ds$
β	-	Power law constant
γ	N/m	Interfacial tension
Δp	Pa	Capillary pressure
ΔP	Pa	$\Delta p_p - \Delta p_g$ Capillary pressure difference
λ_1, λ_2	$m^{2-\beta}$	Attenuation coefficients
μ	$Pa s$	Viscosity
ξ	-	$(R/a)^2 = m/m_0$, dimensionless radius squared, dimensionless mass
ρ	kg/m^3	Density
τ	-	Dimensionless time
ϕ, ϕ_*	-	Porosity, volume fraction, reference volume fraction

Subscript

bg	background
g	Grease
p	Paper
px	Pixel
r, z	Radial, axial direction
0	Initial value
∞	Ambient, final value