



ESDU TECHNICAL MEMORANDUM

Correlation of the micro-texture sharpness parameter F_1

K. Balkwill

ESDU TECHNICAL MEMORANDA

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CORRELATION OF THE MICRO-TEXTURE SHARPNESS PARAMETER F_1

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CORRELATION OF THE MICRO-TEXTURE SHARPNESS PARAMETER F_1

1. NOTATION, DIMENSIONS AND DEFINITIONS

1.1 Notation and Dimensions

		Dimensions
a_{F_1}	parameter in correlation of <i>micro</i> -texture function	—
B	Beta distribution (see Reference 3)	—
D	inflated diameter of tyre	L
d	water depth	L
d_g	depth of groove in runway surface	L
$(d_{TEX})_i$	depth of <i>macro</i> -texture before ($i = 0$) or after ($i = 1$) grooving	L
$(d_{TEX})_{MIN}$	minimum depth of <i>macro</i> -texture	L
F_0, F_2	functions in correlation of side-force relations	—
F_1	<i>micro</i> -texture sharpness parameter	—
$[F_1]_U$	upper bound of function F_1	—
G_{TREAD}	effective shear modulus of tread material	M/LT ²
N	speed number	—
p_{ABS}	inflation pressure in absolute measure	M/LT ²
p_g	pitch of grooves in runway surface	L
$Pr[\]$	probability of event in $[\]$	—
q	dynamic (kinetic) pressure	M/LT ²
q_v	pressure in the viscous region of tyre footprint	M/LT ²
V	ground speed	L/T
V_{YAW}	component of velocity normal to plane of wheel	L/T
w	inflated width of tyre	L
w_g	width of groove in runway surface	L
$B[x, l, m]$	Beta distribution with parameters l and m for a given value of x	—
$B^{-1}[Pr, l, m]$	inverse of Beta distribution with parameters l and m at a given Pr	—
$\eta_4, \eta_{40}, \eta_5$	constants in model	—
Λ	loading parameter	—

λ	phase angle between stress and strain in tyre compound (refer to Equation (4.1) of Reference 2)	radian
ρ_{TREAD}	density of tread material	M/L ³
$1/\tau$	drainage parameter	—
μ_{REF}	reference coefficient of sliding friction	—
μ_{YAW}	coefficient of resistance normal to plane of wheel	—
$(\mu_{YAW})_{DRY}$	coefficient of resistance normal to plane of wheel on dry runway	—
$(\mu_{YAW})_{REF}$	reference coefficient of skidding friction normal to plane of wheel on dry runway	—
$(\mu_{YAW})_{WET}$	coefficient of resistance normal to plane of wheel on wet runway	—
ϕ_E	effective porosity of surface	—
X	function used in Equation (2.1c)	—
ψ	yaw angle	—

1.2 Definitions

<i>Drainage parameter</i>	is the ratio of depth of free-standing water on and the total depth of water on and in the surface.
<i>Footprint</i>	is the jargon term for the interface between loaded tyre and the surface on which it moves.
<i>Micro-texture</i>	is defined as texture in a pavement with a wavelength less than 0.5 mm. Most micro-texture in pavements is manifest as texture on the individual stones and/or the finer sand in the asphalt mixture or concrete mortar.
<i>Macro-texture</i>	is defined as texture in a pavement with a wavelength ranging from 0.5 mm to 50 mm.
μ_{REF}	is the limiting coefficient of resistance force sustained in the footprint: it is related to the maximum shear stress sustainable by molecular adhesion.