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Introductory sheet on subcritical lift-dependent drag of wings

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INTRODUCTORY SHEET ON SUBCRITICAL LIFT-DEPENDENT DRAG OF WINGS

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INTRODUCTORY SHEET ON SUBCRITICAL LIFT-DEPENDENT DRAG OF WINGS

1. NOTATION

		SI	British
A	aspect ratio, $4s^2/S$		
a_1	wing lift-curve slope in viscous compressible flow	rad^{-1}	rad^{-1}
a_{1T}	wing lift-curve slope in inviscid compressible flow	rad^{-1}	rad^{-1}
C_D	overall drag coefficient, drag/qS		
C_{DL}	lift-dependent drag coefficient		
C_{Db}	increase in profile drag coefficient over zero lift value for a plane, symmetrical section wing		
C_{Dp}	profile drag coefficient at lift coefficient C_L		
C_{Dv}	trailing vortex drag coefficient at lift coefficient C_L		
C_L	lift coefficient, lift/qS		
C_{LI}	lift coefficient at intersection of two straight lines approximating to $C_D \sim C_L^2$ data		
C_{LK}	lift coefficient at end of initial linear range of force and moment characteristics		
$C_{LL}(\eta)$	local lift coefficient at spanwise station η		
$c(\eta)$	local wing chord at spanwise station η	m	ft
$\bar{c}$	geometric mean chord, $\int_0^1 c(\eta) d\eta$	m	ft
K	lift-dependent drag factor from simplified $C_D \sim C_L^2$ curve for $C_L \leq C_{LI}$ (see Equation (3.12))		
K_1	slope of simplified $C_{Db} \sim C_L^2$ curve for $C_L \leq C_{LI}$ (see Equation (3.13))		
q	free-stream kinetic pressure	N/m^2	lbf/ft^2
S	gross wing area	m^2	ft^2
s	wing semi-span	m	ft
y	general spanwise station	m	ft

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