SKIN FRICTION DRAG COEFFICIENTS FOR A FLAT PLATE IN TWO-DIMENSIONAL FLOW WITH ZERO HEAT TRANSFER

1. NOTATION AND UNITS

		SI	*British*
C_{Df}	total skin friction drag coefficient of both surfaces, (skin friction drag per unit span)/$(\frac{1}{2}\rho V^2 c)$		
c	chord of plate	m	ft
M	free-stream Mach number		
R	Reynolds number based on plate chord, Vc/ν		
V	free-stream velocity	m/s	ft/s
x_t	distance of transition point aft of leading edge	m	ft
ν	free-stream kinematic viscosity	m^2/s	ft^2/s
ρ	free-stream density	kg/m^3	$slug/ft^3$

2. NOTES

This Item presents the variation of skin friction drag coefficient with Mach number and position of transition for three values of Reynolds number for a smooth flat plate at zero incidence in compressive flow with zero heat transfer.

The curves of Figures 1a to 1c are based on the calculations made in Derivation 1 together with further second order calculations which have subsequently been made to correct the initial calculations for boundary layer displacement effects on the external velocity distribution.

Item No. Aero W.02.04.01 gives similar information for a flat plate in incompressible flow, corresponding to the curves for $M = 0$ of this Item. Comparison of corresponding results for the two Items will show small differences due to the different methods which have been used in the calculations. These differences are in general insignificant.

The data given in this Item are in a convenient form for use with (and are consistent with) Item No. Aero W.S.02.04.13. For more recent information concerning skin friction and other parameters for laminar and turbulent boundary layers on a smooth flat plate Item Nos 68019 and 68020 should be consulted.

3. DERIVATION

The Derivation lists selected sources that have assisted in the preparation of this Item.

1. YOUNG, A.D.
KIRKBY, S.
The profile drag of biconvex and double wedge wing sections at supersonic speeds. Proceedings of the NPL Symposium on boundary layer effects in aerodynamics. HMSO, 1955.

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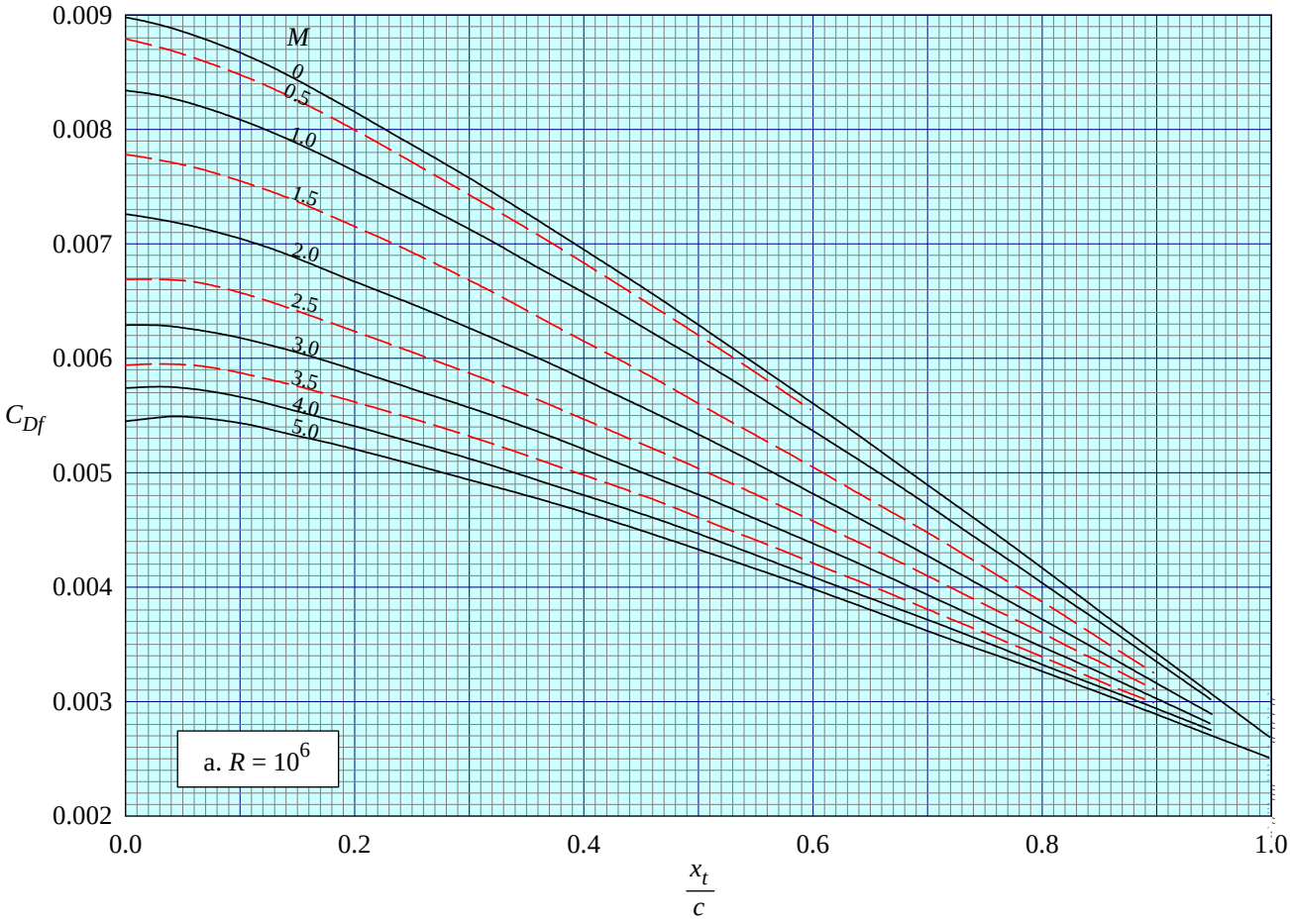

FIGURE 1a

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