

# CFD validation guidelines

- In a band of Reynolds numbers (and Mach numbers), fully turbulent CFD simulations better fits experimental data with forced transition.

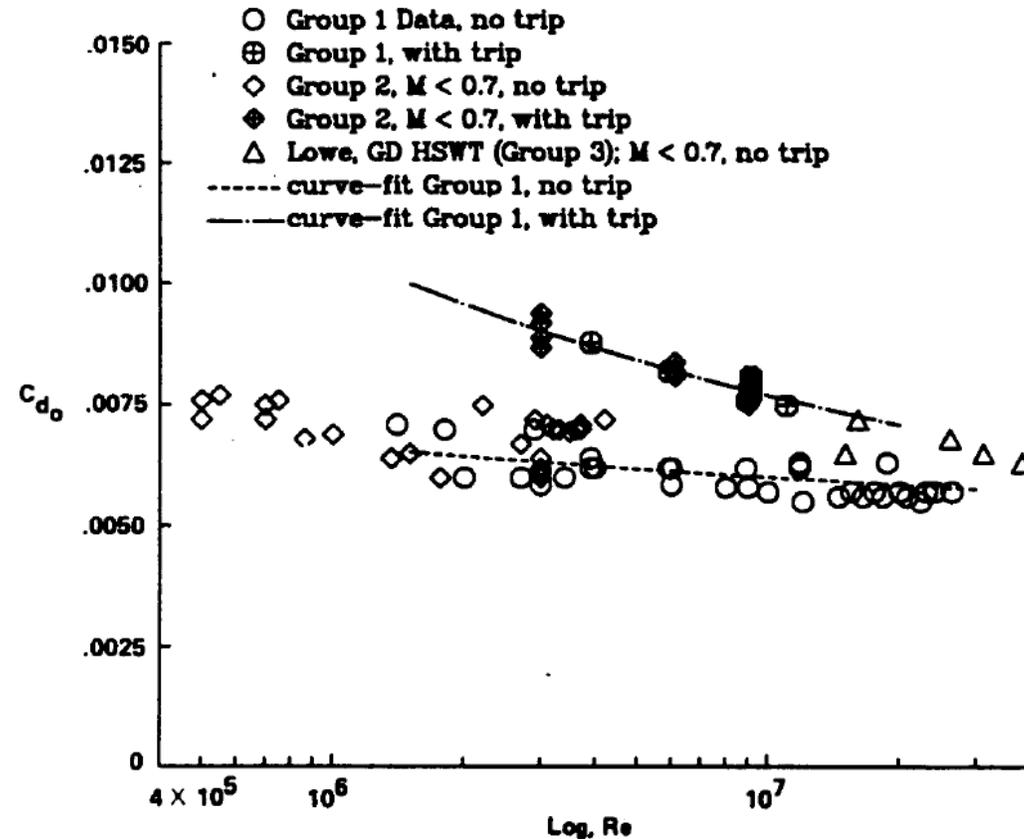
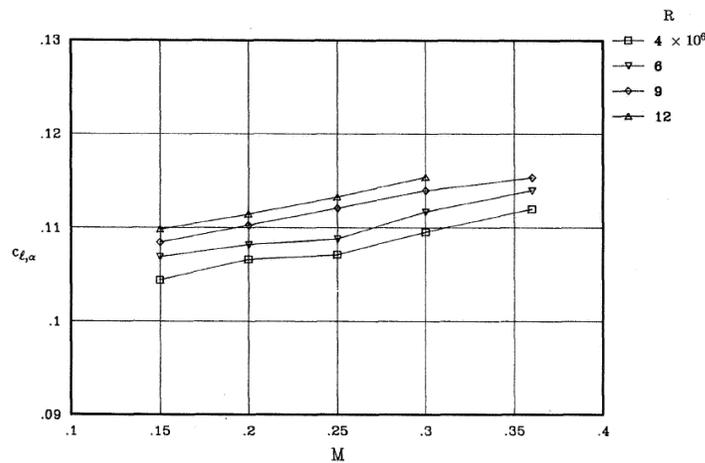


Fig. 4. Drag coefficient at zero lift vs. Reynolds number.

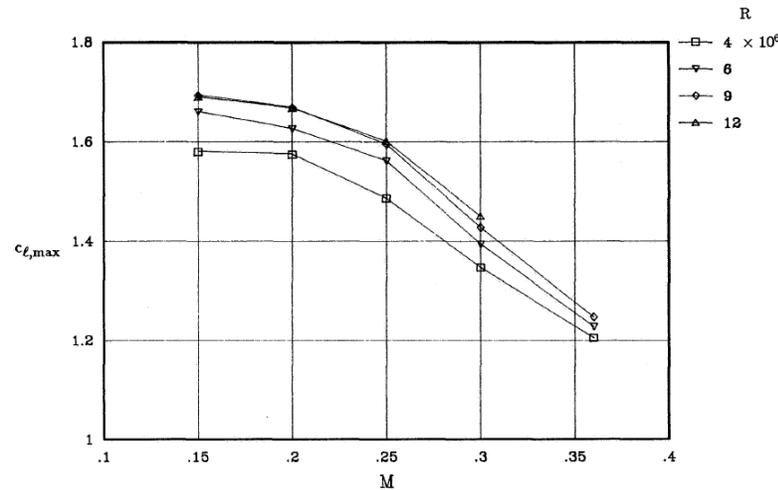
- W. J. McCroskey. A critical assessment of wind tunnel results for the NACA 0012 airfoil.

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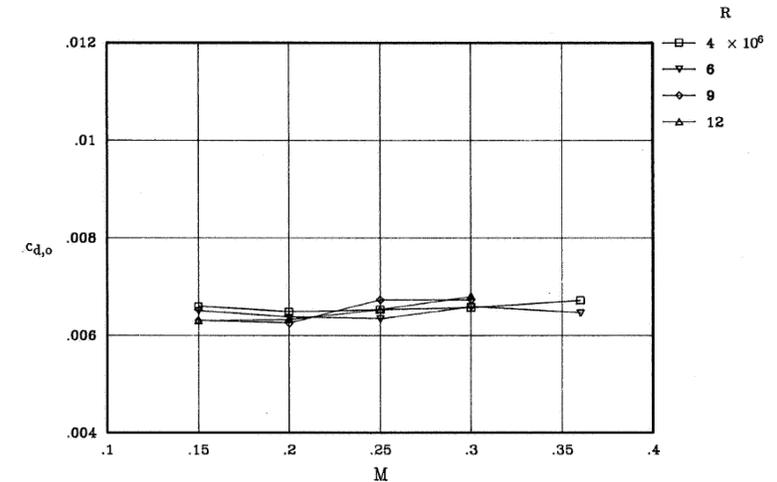
- Many experimental results will ask you to match Reynolds number and Mach number.
- Variations of Reynolds number and Mach number have a strong influence on the lift curve slope and maximum lift.
- Below the critical Mach number, variations of the Mach number have little influence in the zero lift drag.
- In CFD, to match Reynolds number and Mach number you need to know the operating pressure or operating temperature of the wind tunnel. Otherwise, you will need to do an iterative process to guess the right operating conditions.



(a) Variation with Mach number.



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- C. L. Ladson. Effects of independent variation of Mach and Reynolds numbers on the low-speed aerodynamic characteristics of the NACA 0012 airfoil section