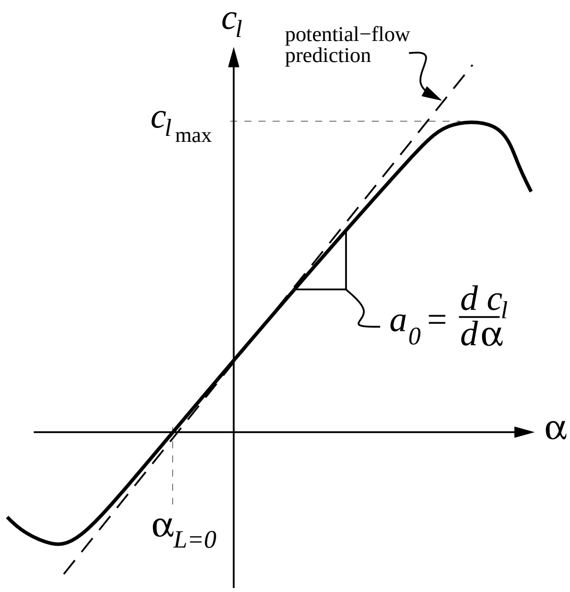
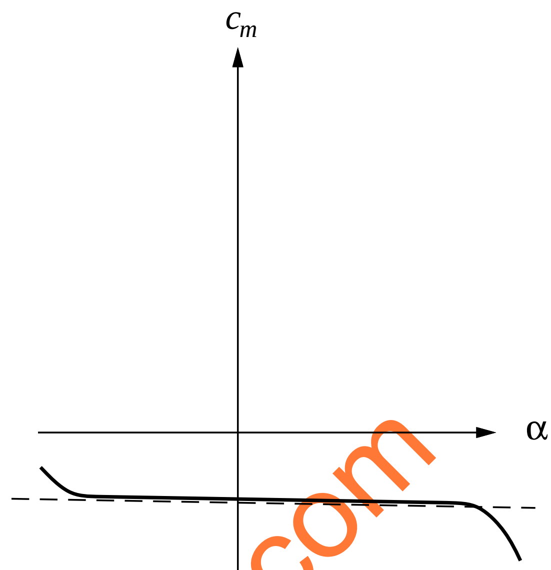
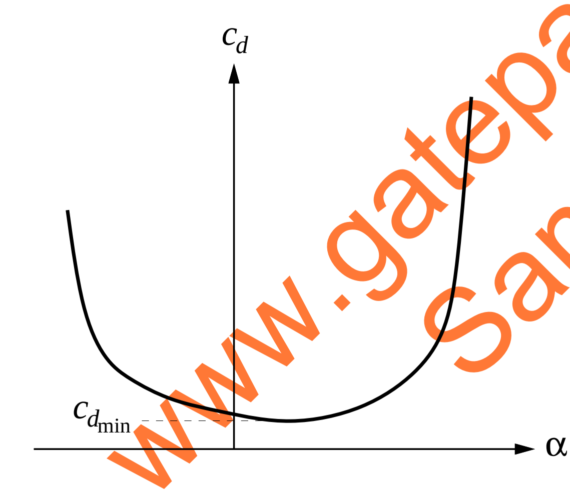
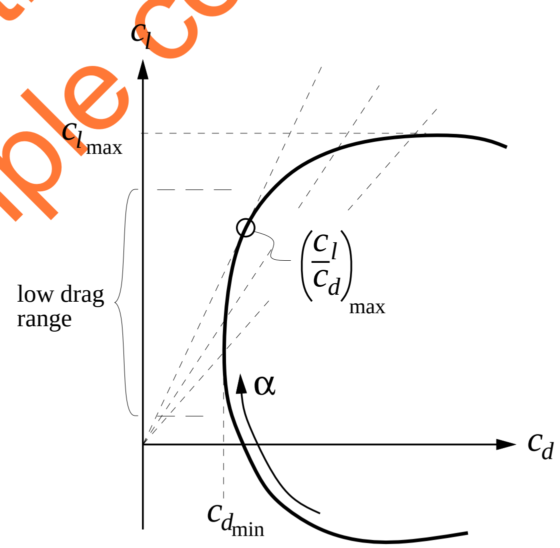




The moment coefficient $c_m(\alpha)$, when defined about the quarter-chord point, is very nearly constant away from stall. Again this is predicted well by potential-flow methods. Past stall, the $c_m(\alpha)$ curve deviates sharply from its constant value.

The drag coefficient c_d can be plotted versus α, as shown in the figure on the left. However, a more useful and more standard way is to plot c_ℓ vs c_d, with α simply a dummy parameter along the curve. This plot is called a *drag polar*, and is shown in the figure on the right.





One reason for using the drag polar format is that when evaluating the aerodynamic performance of an airfoil, the α values are not really relevant. All that matters is the drag and how it compares to lift. The drag polar format compares these directly, and hence summarizes the most important features of the airfoil's drag characteristics in one plot. One such feature is the *maximum lift-to-drag ratio*, or $(c_\ell/c_d)_{\max}$, which is where a line from the origin lies tangent to the polar curve. The $c_{\ell_{\max}}$ and $c_{d_{\min}}$ values are also directly visible. An aerodynamicist might also note the *low-drag range* of lift coefficients where the airfoil naturally wants to operate.

It must be stressed that c_d values are roughly 100 times smaller than typical maximum c_ℓ values. Hence, the c_d axis on a polar plot is greatly enlarged.