(2) The *chord* is the characteristic dimension of the airfoil.

(3) The *mean-camber line* is a line drawn halfway between the upper and lower surfaces. Actually, the chord line connects the ends of the mean-camber line.

(4) The shape of the mean-camber line is very important in determining the aerodynamic characteristics of an airfoil section. The *maximum camber* (displacement of the mean line from the chord line) and the *location* of the maximum camber help to define the shape of the mean-camber line. These quantities are expressed as fractions or percent of the basic chord dimension. A typical low speed airfoil may have a maximum camber of 4 percent located 40 percent aft of the leading edge.

(5) The thickness and thickness distribution of the profile are important properties of a section. The *maximum thickness* and *location* of maximum thickness define thickness and distribution of thickness and are expressed as fractions or percent of the chord. A typical low speed airfoil may have a maximum thickness of 12 percent located 30 percent aft of the leading edge.

(6) The *leading edge radius* of the airfoil is the radius of curvature given the leading edge shape. It is the radius of the circle centered on a line tangent to the leading edge camber and connecting tangency points of upper and lower surfaces with the leading edge. Typical leading edge radii are zero (knife edge) to 1 or 2 percent.

(7) The *lift* produced by an airfoil is the net force produced *perpendicular* to the *relative wind*.

(8) The *drag* incurred by an airfoil is the net force produced *parallel* to the *relative wind*.

(9) The *angle of attack* is the angle between the chord line and the relative wind. Angle of attack is given the shorthand notation α (alpha). Of course, it is important to differentiate between pitch attitude angle and angle of attack. Regardless of the condition of flight, the instantaneous flight path of the surface determines the direction of the oncoming relative wind and the angle of attack is the angle between the instantaneous relative wind and the chord line. To respect the definition of angle of attack, visualize the flight path of the aircraft during a loop and appreciate that the relative wind is defined by the flight path at any point during the maneuver.

Notice that the description of an airfoil profile is by dimensions which are fractions or percent of the basic chord dimension. Thus, when an airfoil profile is specified a *relative* shape is described. (NOTE: A numerical system of designating airfoil profiles originated by the National Advisory Committee for Aeronautics [NACA] is used to describe the main geometric features and certain aerodynamic properties. NACA Report No. 824 will provide the detail of this system.)

AERODYNAMIC FORCE COEFFICIENT. The aerodynamic forces of lift and drag depend on the combined effect of many different variables. The important single variables could be:

(1) Airstream velocity
(2) Air density
(3) Shape or profile of the surface
(4) Angle of attack
(5) Surface area
(6) Compressibility effects
(7) Viscosity effects

If the effects of viscosity and compressibility are not of immediate importance, the remaining items can be combined for consideration. Since the major aerodynamic forces are the result of various pressures distributed on a surface, the *surface area* will be a major factor. *Dynamic pressure* of the airstream is another common denominator of aerodynamic forces and is a major factor since the *magnitude* of a pressure distribution depends on the source energy of the free stream. The remaining major factor is the relative *pressure distribution*