The effect of these vortices is to create more down wash behind the wing than up wash in front of the wing. This results in the effective air flow (EAF) being inclined to the relative air flow (RAF) by an angle called the induced angle of attack (αi).

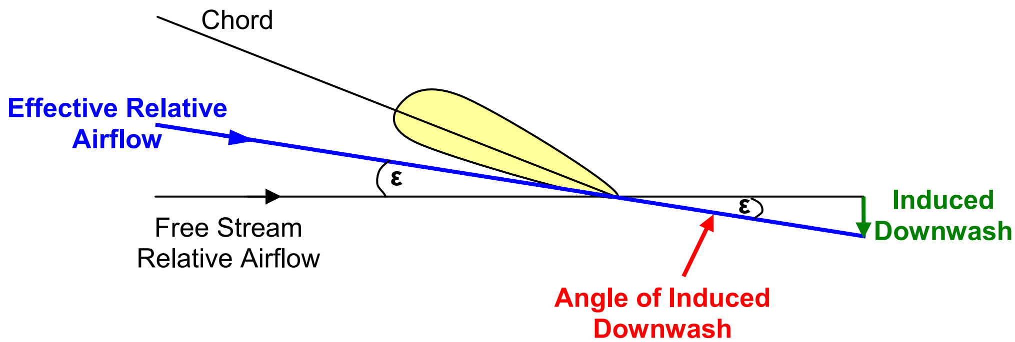

FIG. 4.28

The downwash deflects the airflow downward from the horizontal through an angle; known as the **angle of induced downwash (ε)**. This effect is not only apparent behind the wing, but also influences the airflow approaching the wing by deflecting it upward from the horizontal through the same angle (α). The resulting airflow is known as the **effective relative airflow**, and the angle it makes to the horizontal is better known as the **induced angle of attack** (α_i)**, (ineffective angle of attack)**. (Fig. 4.29).

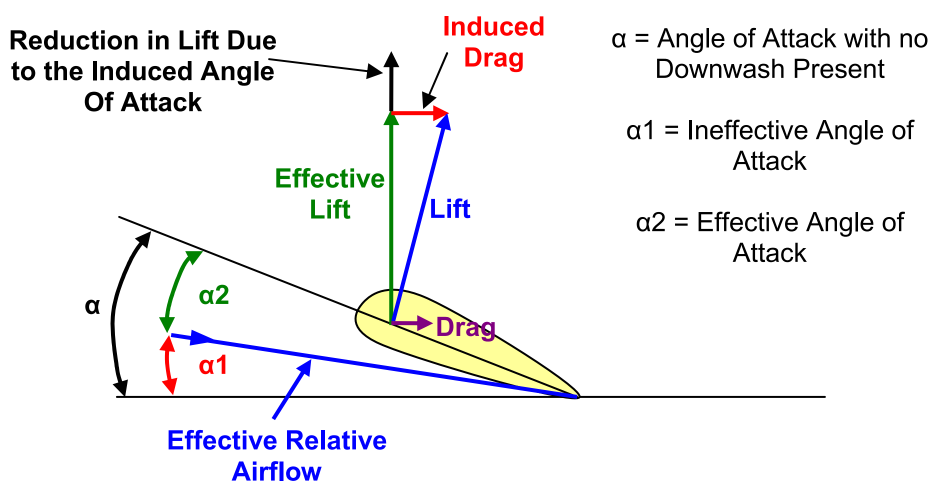

FIG. 4.29

Because the lift force acts perpendicular to the effective airflow (EAF) the lift vector is inclined rearward through the same angle, (αi). The angle of attack producing this lift force is the effective angle of attack (αe), which is smaller than the original angle of attack between the RAF and the wing chord. However, a component of the lift force acts horizontally, retarding the forward motion of the aeroplane. This component of lift is induced drag. The induced drag increases when the coefficient of lift increases, and therefore induced angle of attack increases. The amount of lift acting vertically upward is known as effective lift. It reduces as the induced angle of attack increases.

