1. The basic premise of the theory is that for an airfoil in a uniform flow $V_\infty$, the airfoil can be replaced by a vortex sheet along the chord line. The strength of the vortex sheet, $\gamma(x)$ is determined by the condition that the camber line must also be a streamline. This leads to the following singular integral equation
\[
\frac{1}{2\pi} \int_0^c \frac{\gamma(\xi)d\xi}{x-\xi} = V_\infty[\alpha - (\frac{dz}{dx})].
\] (1)

2. It is convenient to introduce the variables $\theta$ and $\theta_0$;
\[
x = \frac{c}{2}(1 - \cos \theta_0),
\]
\[
\xi = \frac{c}{2}(1 - \cos \theta).
\] (2, 3)

Substituting (2, 3) into (1),
\[
\frac{1}{2\pi} \int_0^\pi \frac{\gamma(\theta)\sin \theta d\theta}{\cos \theta - \cos \theta_0} = V_\infty[\alpha - (\frac{dz}{dx})].
\] (4)

Then, we assume the following expansion for the strength of the vortex sheet
\[
\gamma(\theta) = 2V_\infty(A_0 \frac{1 + \cos \theta}{\sin \theta} + \sum_{n=1}^{\infty} A_n \sin n\theta),
\] (5)
where $A_0, A_1, A_2, \ldots$ are constants to be determined in terms of the angle of attack $\alpha$ and the slope of the camber line $dz/dx$.

3. Substituting (5) into (4) and noting that
\[
\frac{1}{\pi} \int_0^\pi \frac{\cos n\theta d\theta}{\cos \theta - \cos \theta_0} = \frac{\sin n\theta_0}{\sin \theta_0},
\] (6)
gives
\[
\frac{dz}{dx} = (\alpha - A_0) + \sum_{n=1}^{\infty} A_n \cos n\theta.
\] (7)
Thus, $(\alpha - A_0), A_1, A_2, \ldots$ are the Fourier coefficients of $dz/dx$. Therefore, we have
\[
A_0 = \alpha - \frac{1}{\pi} \int_0^\pi \frac{dz}{dx} d\theta,
\] (8)
\[
A_n = \frac{2}{\pi} \int_0^\pi \frac{dz}{dx} \cos n\theta d\theta \quad \text{for} \quad n = 1, 2, \ldots
\] (9)
4. All aerodynamic quantities can now be calculated from $A_0, A_1, A_2, \ldots$

$$\Gamma = \pi c V_\infty (A_0 + \frac{A_1}{2}),$$  \hspace{1cm} (11)

$$c_l = \pi (2A_0 + A_1),$$  \hspace{1cm} (12)

$$c_{m,le} = -\frac{\pi}{2} (A_0 + A_1 - \frac{A_2}{2}) = -\frac{c_l}{4} + \frac{\pi}{4} (A_2 - A_1),$$  \hspace{1cm} (13)

$$x_{cp} = \frac{c}{4} \left[ 1 + \frac{\pi}{c_l} (A_1 - A_2) \right],$$  \hspace{1cm} (14)

$$c_{mac} = c_{m,\ell/4} = \frac{\pi}{4} (A_2 - A_1).$$  \hspace{1cm} (15)