$$y'' = \frac{\epsilon}{2}(C_1 + C_2) - \frac{\epsilon}{L}(C_1 - C_2)x$$

Where $\epsilon = \frac{1}{EI_0}$, I_0 =Moment of inertia about mirror cross-section, E =Young's Modulus and L = mirror length.

$$y' = \frac{\epsilon}{2}(C_1 + C_2)x - \frac{\epsilon}{2L}(C_1 - C_2)x^2 + C_3 \tag{1}$$

$$y = \frac{\epsilon}{4}(C_1 + C_2)x^2 - \frac{\epsilon}{6L}(C_1 - C_2)x^3 + C_3x + C_4 \tag{2}$$

$y = 0$ at $x = -\frac{L}{2}$:

$$C_4 = \frac{L}{2}C_3 - \frac{\epsilon L^2}{16}(C_1 + C_2) - \frac{\epsilon L^2}{48}(C_1 - C_2) \tag{3}$$

$y = 0$ at $x = \frac{L}{2}$:(plug in expression for C_4, eqn (3))

$$C_3 = \frac{\epsilon L^2}{24}(C_1 - C_2) \tag{4}$$

Plug eqn (4) back in to eqn (3) to get C_4:

$$C_4 = \frac{\epsilon}{48}(C_1 - C_2)(L^3 - L^2) - \frac{\epsilon L^2}{16}(C_1 + C_2) \tag{5}$$

Then plugging eqn (4) and (5) back in to (2) yields:

$$y = \frac{\epsilon}{4}(C_1 + C_2)x^2 - \frac{\epsilon}{6L}(C_1 - C_2)x^3 + \frac{\epsilon L^2}{24}(C_1 - C_2)x + \frac{\epsilon}{48}(C_1 - C_2)(L^3 - L^2) - \frac{\epsilon L^2}{16}(C_1 + C_2) \tag{6}$$