## Solution to Problem 290B

If we assume a circular path, as the problem states, the lift force due to spin must be equal to the centripital force on the baseball.

$$\rho U \Gamma a = \frac{mU^2}{R}$$

With the given relationship for the circulation, $\Gamma = 2\pi a^2 \omega$, the radius of the ball's trajectory is:

$$R = \frac{mU}{2\pi a^3 \omega \rho} = \frac{(0.2)(40)}{(2\pi)(0.03)^3(200)(1)} = 235.8m$$

From the geometry:

$$(R - H)^2 + L^2 = R^2$$

$$\Rightarrow H = R - \sqrt{R^2 - L^2} = 0.85m$$