The uniform rectangular plate has a mass of 300 kg and is supported in the vertical plane by the two parallel links of negligible mass and by the cable AC. If the cable suddenly breaks, determine the angular velocity \( \omega \) of the links at an instant before the plate strikes the horizontal surface \( E \). Also find the force in member \( DC \) at the same instant.

\[ \text{Ans. } \omega = 3.50 \text{rad/s}, F_{DC} = 1472 \text{N} \]

\[ m = 300 \text{kg} \]

Find \( \omega \)

\[ T_2 = \frac{1}{2} m v^2 \]

\[ v_{y1} = mg \gamma \]

\[ 0 = \frac{1}{2} m v^2 - m g \gamma \]

\[ \frac{1}{2} mg v^2 = m g \gamma \]

\[ v = 2 \gamma y \]

\[ v = \sqrt{2 g \gamma} = \sqrt{2 (9.81)(0.4)} \]

\[ v = 2.80 \text{m/s} \]

\[ \omega = \frac{v}{r} = \frac{2.801}{0.8} = 3.502 \text{ rad/s} \]

\[ F_{DC} = \frac{1}{2} m \omega^2 \]

\[ = \frac{1}{2} (300)(3.502^2)(0.8) \]

\[ F_{DC} = 1471.5 \text{N} \]

\[ \text{Forces are the same so} \]

\[ F_y = m g \gamma \quad \omega = \omega \]

\[ F_A = F_0 = m(-\omega \dot{\gamma}) \]

\[ F_A = F_0 \]

\[ y_i = 0.8 \sin(30) \]

\[ y_i = 0.4 \]