T1: Floating cylinder (10 pts)

A solid, uniform cylinder of height $h = 10$ cm and base area $s = 100$ cm^2 floats in a cylindrical beaker of height $H = 20$ cm and inner bottom area $S = 102$ cm^2 filled with a liquid. The ratio between the density of the cylinder and that of the liquid is $\gamma = 0.70$. The bottom of the cylinder is above the bottom of the beaker by a few centimeters. The cylinder is oscillating vertically, so that its axis always coincides with that of the beaker. The amplitude of the liquid level oscillations is $A = 1$ mm.

Find the period of the motion T. Neglect the viscosity of the liquid.