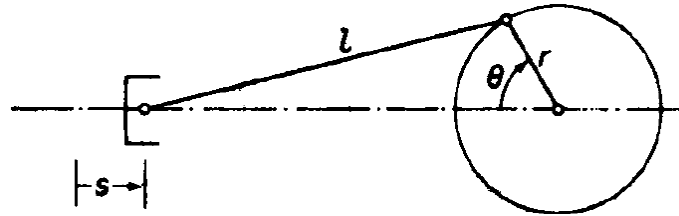


**Problem 1.17**

Write the equation for the displacement  $s$  of the piston in the crank-piston mechanism shown in Fig. P1.17, and determine the harmonic components and their relative magnitudes. If  $r/l = \frac{1}{3}$ , what is the ratio of the second harmonic compared to the first?

**FIGURE P1.17.**